STRUCTURAL ADJUSTMENT AND AGRICULTURE:
Developing A Research Analytical Framework

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STRUCTURAL ADJUSTMENT AND AGRICULTURE:
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I. INTRODUCTION

The Philippines has gone through several episodes of structural adjustment and stabilization policies since the 1980s. Structural adjustment policies are economy-wide policy reforms implemented to improve economic efficiency, increase growth, and correct fundamental disequilibrium situations in the external and public sector payment accounts of the country. A stabilization policy, meanwhile, aims to minimize fluctuations in general economic activity and price level.

The structural adjustment process began as early as the 1980s. The tariff reform program launched in 1981 drastically cut down the average tariff protection rate and reduced the scope of tariff discrimination. The import liberalization program started in 1982 eventually eliminated discretionary import licensing for over two thousand products. The program, however, was interrupted in 1983 by a balance of payments (BOP) crisis. Financial liberalization, also initiated in 1981, tried to put an end to high interest rates and restrictive banking regulations, among others.

When the new government took over in 1986, the reform process continued. In 1986, the import liberalization program, suspended since the 1983 BOP crisis, again took effect. The exchange rate slid from ₱ 22 in 1986 to ₱ 27 in 1990 to a US dollar. Government expenditures were slashed to curb creeping inflation and the government's budgetary deficit. Money supply was controlled to stabilize prices.

How did the agricultural sector respond to all these macroeconomic reforms? Has the sector become more efficient? Did these reforms provide new jobs in the rural areas? Did the country expand its agri-based exports? Did a significant growth occur in the gross value added

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of agriculture? How did the policy changes influence the various microeconomic producers and consumers of agricultural products? Who benefited from the reforms? How are the disadvantaged sectors coping with the difficulties encountered since the start of these reform programs? Did these reforms reduce the number and extent of rural poverty? All these issues of impact analysis strive to identify the structural adjustment time path or strategy that imposes the least adjustment cost on the poor.[1]

This paper will review some of the attempts made to estimate the microeconomic effects of macroeconomic policies, and develop an analytical framework capable of evaluating the impacts of such structural adjustment and stabilization policy issues, as they affect the agricultural sector, its various sub-sectors, households, and the Philippine economy in general.

In particular, this study suggests that a computable general equilibrium (CGE) model of the Philippine economy be used to measure and analyze the impacts. Several features of such a model are suggested to enable it to adequately address the structural adjustment issues.

Besides the CGE model approach, the paper also suggests the use of a macroeconometric model of the Philippine economy to calculate the short-run effects of macroeconomic policy reforms, such as the effect of a currency devaluation. These effects, in turn, will serve as inputs for the CGE model, to calculate the resource allocation and distributional effects of such policy changes. The interphase between the CGE and the macroeconometric models is also described in this paper.

In developing this paper, the author first reviewed the major structural adjustment policies introduced into the Philippine economy in the past decade (see next section). In discussing these policies, the paper highlighted broad categories of policies to determine the essential features which must be incorporated into the CGE model and the macroeconometric model.

The third, fourth, and fifth sections illustrate some policy experiments using CGE models involving trade policies, value added tax policies, and the exchange rate. These experiments were done in Clarete (1989, 1991a, and 1991b) using various specifications of the CGE model. The third section examines the impacts of trade policy reforms including the 1981 tariff policy reforms and the import liberalization program.

The fourth section discusses the use of the value added tax (VAT) to replace several turnover taxes. The VAT is collected using the credit method. It exempts the entire primary agricultural sector. This inadvertently imposes a higher VAT rate on agricultural processing and, consequently, discourages resources from moving into these affected sub-sectors. The impact of such a method is examined.

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[1]See for example Cornia et al. (1987).

The fifth section of the report calculates the effect of an overvalued currency. Forestalling exchange rate adjustments required to contain inflation during a deteriorating BOP situation remains an enduring feature of macroeconomic stabilization in the Philippines. In the past, exchange rate depreciations had to wait until a fullblown BOP crisis occurs, when nothing can be done to avoid the depreciations.

All the above simply illustrate what the CGE model approach can offer for studies on microeconomic impacts of macroeconomic policies.

The sixth section of the paper lays down the structural requirements of the CGE and macroeconometric models, to address the kinds of macroeconomic policies identified in the second section. Also discussed is how the two models will interact with each other.

The last section gives an overview of the CGE model of the Philippine economy.

II. STABILIZATION AND STRUCTURAL ADJUSTMENT POLICIES[2]

A. *Highlights*

This section describes the stabilization and structural adjustment policies adopted by the Philippine government since the 1980s. The imposition of these policy measures coincided with the occurrence of major crises in the country's BOP. Stabilization policies aim to correct imbalances of the fiscal and external accounts of the country, as well as bring down the rate of inflation to the lowest level possible. The main elements of a typical stabilization package for the Philippine economy include --

- A currency devaluation to shrink the deficit in the economy's BOP account to a manageable level;
- Higher taxes, improved tax administration, lower government spending and subsidies, and higher charges for publicly provided services and goods to reduce the fiscal deficit to a sustainable level;
- External debt service rescheduling, if necessary;
- Issuance of government bonds to finance the government deficit and control the money supply; and
- Restraint on wage increases to contain inflation.

A stabilization package is usually accompanied by a program of policy reforms meant to reallocate resources in order to improve economic efficiency and growth, thus diminishing the

[2]This section is based on a report submitted by Ms. de la Pena, a research consultant for this study.

possibility of a macroeconomic instability in the future. These structural reform programs consist of --

- Trade policy reforms including the elimination of controls over imports, lower level and dispersion of tariff protection, elimination of implicit and explicit taxes on traditional exports, as well as promotion of non-traditional exports;
- Liberalizing regulations on foreign investments;
- Financial liberalization including policies that allow real interest rates to seek their competitive levels in order to eliminate credit rationing, more liberal banking regulations, and promotion of new credit instruments and institutions;
- Decontrolling or at least adjusting prices of food products to encourage private investments and increase productivity in agriculture;
- Decontrolling the prices of other products subject to price controls, particularly of those where shortages occur;
- Paring down the number of regulations that inhibit market competition;
- Privatization to shift resources from the government to the private sector, particularly in those products that can be provided more efficiently by the latter; and
- Tax policy reforms that remove any inefficiencies or inequities embedded in the tax system and that improve tax administration.

B. *1980 to 1985 Period*

In responding to the second oil price shock in 1979, the government approved two rounds of nationwide increases in oil prices in 1980. These adjustments raised power, water, transport, and freight rates. Price controls on selected commodities were imposed. The NFA opened up more KADIWA food centers which sold food items at subsidized prices. The government also ordered employers to pay higher minimum nominal wages to their workers.

Monetary policy shifted from being conservative in the 1970s to expansionary in the 1980s. The reserve requirement against demand deposits slid from 20 percent to 16 percent at the rate of one percentage point per semester starting January 1982. The Central Bank (CB) extended emergency advances to banks and quasi-banks following a financial crisis in the first quarter of 1981. It continued to channel credit to selected sectors using various credit seed-fund and guarantee facilities. It provided relief to selected enterprises with liquidity problems through government-owned banks.

In 1980, the government set out to reform its financial policies. It removed the functional distinctions among financial institutions and established a modified form of universal banking.

The program also adopted a market-oriented interest rate policy. In 1980, monetary authorities floated the interest rate ceilings on long-term loans at a rate not to exceed a reference rate (MRR) plus a margin. The interest rate ceilings on other lending and deposit instruments were removed in 1981, except on loans with maturities of less than a year whose ceiling rates

were finally lifted in 1982. Rediscount rates also aligned with market rates of interest, although the rediscounting facility continued to give preferential treatment to selected sectors.

While these financial policy reforms took place, the BOP suffered setbacks due to the increasing difficulty of acquiring new credit abroad and the rising interest cost on the growing external debt of the country. In the meantime, the country's import bill continued to surge as a result of the expansionary nature of government spending and monetary policies. Export receipts, on the other hand, lagged behind imports due to the economic recession in the developed world in the early 1980s.

These difficulties in managing the country's external payments account forced the government to agree to the structural adjustment programs which required trade liberalization. In 1981, the government launched its tariff reform program which pruned the average tariff rate from close to 50 percent to about 28 percent. The tariff reforms were implemented gradually within a five-year period.

Another structural adjustment program committed the government to removing non-tariff import restrictions. This import liberalization program began in 1982, even as the tariff reform program was just starting to gain steam. In that year, it successfully removed the import ban on 67 percent of the restricted items prior to the program.

While the monopsony control by crony capitalists continued in the sugar, coconut, and food industries of the economy, one good news occurred in the first half of the 1980s.[3] The coconut levy, assessed on production and ultimately paid by coconut producers, was lifted in 1982.

In a period when the economy was grappling with a bursting current accounts deficit, trade liberalization received the least priority among the tasks of the government. Thus, these reforms in the early 1980s, which clearly were implemented to acquire concessionary credit from multilateral funding agencies, hardly prevented the international reserves of the country from plummeting down to critical levels.

While a BOP crisis already threatened the country, the assassination of Sen. Benigno Aquino in mid-1983 provided the trigger that broke the system into a financial paralysis. A string of closures of commercial credit lines to the country followed the political assassination. Liquidation of assets and salting foreign exchange assets out of the country became frequent. Reverse capital flows prevailed when the country needed just the opposite. Toward the end of 1983, the country's worst BOP crisis occurred.

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[3]In the 1970s, the coconut, sugar, and food industries were monopolized by companies controlled by cronies of former President Marcos. A coconut levy was also imposed on production in order raise funds to develop the coconut industry.

In response to the 1983 BOP crisis, the government --

- Allowed the peso to depreciate substantially in June 1983 and again in October 1983;
- Approved increases in petroleum prices and ceiling prices of controlled items;
- Increased minimum wages;
- Raised reserve requirements on short-term deposit liabilities by five percentage points, slowed down credit operations of various CB facilities, raised yields on CB instruments, but provided extensive emergency advances to financial institutions faced with liquidity problems;
- Imposed a 90-day moratorium on the repayment of debts owed to foreign banks and financial institutions except for trade related credits;
- Imposed a system of direct exchange controls and adopted an import prioritization scheme. These required all banks to sell their foreign exchange receipts to the CB for placement in a pool to be used to meet payments based on the following prioritization: oil imports; official development assistance loans; trade related payments for inputs to export products, raw materials for vital domestic industries, and food grains; interest on bank loans, and interbank loans, and trade related credits;
- Imposed a surcharge of three percent on all imports and required importers to deposit in banks the full amount of duties upon opening letters of credit (LCs);
- Suspended the import liberalization program; and
- Significantly slashed the budgetary deficit from 4.3 percent of gross national product (GNP) in 1982 to two percent in 1983.

The moratorium on payments of a large portion of maturing foreign debt continued throughout 1984. Foreign exchange pooling and the import prioritization scheme remained until October 1984 when they were dismantled. In their place, the peso was devalued further by 41 percent in the same year. The surcharge on imports climbed from three percent to five percent in March 1984 and further to 10 percent three months later. This import levy went down to five percent in January 1985. Additional duties of 30 percent were imposed on exports in 1984, only to be suspended later in the same year. In October 1984, the government removed all price controls except for rice. The rice price ceiling was finally removed in 1985. Minimum wages were increased three times in 1984 but the real minimum wage declined slightly due to inflation.

C. *From 1986 Onwards*

Trade policy. The change of government in 1986 paved the way for more policy reform measures, particularly in trade. The import liberalization program (ILP), started in the early 1980s but suspended in the aftermath of the 1983 BOP crisis, resumed its effectivity in 1986. A total of 2,287 items were liberalized by June 1988, marking the end of Phase I of ILP. An

additional 185 items were liberalized from December 1988 to December 1990 under the second phase:.

- Ninety-four items were liberalized on 30 December 1988. These items included non-metric measuring devices, games and amusement (except equipment of indoor games, n. e. s.), radio telecommunications equipment, glassware/ dinnerware/silverware, spare parts/machinery for the pulp and paper industry, consumer durables, cinematographic films and other works, brand new trucks and engines (except for seven items covered under the Commercial Vehicle Development Program, and other non-essential consumer (NEC) goods.
- Ninety-two items were liberalized by CB Circular Nos. 1195 (three items) in March, 1205 (60 items) in July, 1210 (12 items) in September, and 1212 (17 items) in October, 1989. These included portland cement, hydraulic cement, textile and coconut industries, radiation-emitting apparata and related devices, newsprint, marine vessels and appurtenances, friction materials of asbestos, ball and roller bearing, and cylinder liners or sleeves of automobiles, trucks, buses, and motorcycles.
- Another 39 items of automotive spare parts were liberalized through CB Circular No. 1219 issued in December 1989.
- Six more items (spare parts for cars, trucks, utility vehicles, motorcycle and engines) were liberalized through CB Circular 1231 dated 27 February 1990.

A total of 2,462 items were, thus, liberalized from 1982 (when the program was started) to 1990 under ILP's two phases. The government further committed to liberalize 323 items of the remaining 439 restricted items before the end of 1994, except in industries that require a longer implementation period within which to rationalize, modernize, and expand investments. The balance of 116 items will remain restricted for security and health reasons.

As part of the trade reform, the principal instrument of industry protection shifted from quantitative to tariff restrictions. Thus, tariff rate changes affected a few items covered by the ILP. Republic Act (RA) 6647, approved on 29 January 1988, adjusted the rates of duty on 136 tariff lines covering some agricultural products, iron and steel products, artificial resins and plastic materials, tires, paper and paperboard products, polyester fibers, glass products, and refractory goods. Executive Order (EO) Nos. 353 and 364 issued in March and July 1989, respectively, adjusted tariffs on hydraulic and portland cement and clinker other than for white cement, foundry coke, fuel oils, rattan poles, naphtha, logs, newsprint, styrene butadiene rubber, textile packing and gaskets, ethylene glycol, and chassis fitted with engines for trucks and buses.

Certain tariff changes responded to emergency situations, such as the December 1989 coup d'etat attempt. Tariffs on certain critical items, notably spare parts and components of motor vehicles, decreased under National Emergency Memorandum Order (NEMO) No. 8 issued on 23 January 1990. Although these tariff adjustments were to last only for the duration of the emergency situation, the effectivity was extended indefinitely by EO No. 404 issued on 8 June

1990. NEMO No. 27 issued on 22 May 1990 brought down the import duties on diesel and fuel from 20 percent to 10 percent, effective for six months to ensure adequate supply of said products. Eliminating the import duty on cement and cement clinker set by EO 353 (dated 27 March 1989), EO 387 was also extended up to 1992 to beef up cement supply.

A more fundamental revision of the tariff structure took place with the issuance of EO 413 on 19 July 1990. The EO pared down the number of tariff levels from seven to four and cut the tariff range from zero percent - 50 percent to three percent - 30 percent. Duties on 4,353 tariff lines, representing 70 percent of the tariff lines covered by the Tariff and Customs Code, were modified. Through these tariff changes, EO 413 sought to achieve a more even effective protection across industries, promote a more efficient use of resources, enhance the international competitiveness of the country's industries, improve the access of downstream industries to essential raw material inputs, make available to consumers quality products at reasonable prices, and simplify customs administration. Its implementation, however, was held in abeyance by Memorandum Order No. 315 issued by the President on 30 August 1990 in view of House and Senate resolutions seeking to defer the EO's effectivity.

Subsequently, EO 470, a modified version of EO 413, took effect on 24 August 1991. The EO provides a final tariff rate structure of 3 percent, 10 percent, 20 percent, and 30 percent. A parallel tier of 5 percent, 15 percent, 25 percent, and 50 percent was applied to a few selected items. The tariff changes will take place in several phases over five years to provide the industries concerned sufficient time to undertake necessary adjustments at the least possible cost.

To boost government revenues, an additional import duty of five percent was levied on all imports in December 1990. This levy shot upwards to nine percent in January 1991 and slid back to five percent in August of the same year.

The government also implemented measures to enhance the country's export earning capacity and maximize efficiency in the use of productive resources:

- The export ban on copra was abolished in March 1986.
- The export marketing structure for coconut and sugar products was liberalized in 1986 when the government authorized all coconut and sugar millers and other exporters to ship their products directly to the world market. This measure effectively dismantled the marketing monopoly of the United Coconut Mills, Inc. (UNICOM) for coconut and the National Sugar Trading Corporation (NASUTRA) for sugar.
- All export taxes except those on logs were lifted effective 1 July 1986.

Tax policy. A tax reform package was adopted in 1986 to make the tax structure more equitable, progressive, revenue productive, and economically efficient.

To rationalize fiscal incentives and increase tax revenues, EO 93, issued in 1986, withdrew all existing tax and duty exemptions unless restored by the Fiscal Incentives Review Board (FIRB). In 1987, the government generated around ₱4.9 billion in tax revenues with the implementation of EO 93.[4]

However, about ₱2.5 billion worth of tax exemptions, including ₱1.1 billion in grains subsidies, were restored. The Fertilizer and Pesticide Authority and the Bureau of Treasury received tax subsidies totaling ₱1.1 billion to replace tax exemptions withheld by EO 93.[5]

The Tax Reform Package has the following other features:

- A partial global system of taxation with zero percent to 35 percent tax rates on personal income was reintroduced.
- Married couples were allowed to file tax returns separately so that they are not subject to the higher tax rates applicable to their combined incomes.
- Corporate income tax was set at a uniform 35 percent, replacing the previous rates of 25 percent for the first 100,000 pesos and 35 percent for the remainder, if any.
- The tax on passive income of both corporations and individuals increased from 15 percent to 20 percent.
- The intercorporate dividends tax was abolished and the tax on shareholders' dividend income was phased out over a five year period.
- Excise taxes on petroleum products, tobacco products, and alcohol products changed from a combination of both specific and ad-valorem taxes to purely ad-valorem. The conversion effectively increased the taxation of alcohol and tobacco products on 1 July 1986 and decreased that of petroleum products effective on 17 June 1987.

The most significant component of this reform package is the adoption of the Value Added Tax (VAT) starting in 1988. EO 276 levied a 10 percent VAT on the production and sale of all goods and services except agricultural products, products destined for export, and the petroleum sector. This uniform tax replaced several multi-rated indirect taxes, including the sales tax which had five rates and the turnover tax.

On investment incentives, the Omnibus Investments Code (OIC) approved in July 1987 laid down the various incentives offered by the government to investors in preferred areas. These include a tax holiday for six years; exemptions from taxes on imported capital equipment, spare parts, raw materials, breeding stocks and genetic materials; tax credits on domestically

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[4]Foregone revenues before EO 93 reached an estimated P 7.4 billion.

[5]In the same year, the FIRB granted tax exemptions to the National Power Corporation, the Asset Privatization Trust, the Philippine International Trading Corporation, local oil companies exporting processed crude oil, and Filipino overseas contract workers. The Omnibus Investment Code of 1987 also provided tax and duty exemptions and credits to investments in preferred sectors of the economy.

procured equipment and raw materials; and deduction of certain expenses from taxable income. The Investments Priorities Plan (IPP), which is updated annually, lists the preferred areas of investment that can get the incentives under the OIC.

The controversial coconut production levy was lifted in 1982. This levy originally tried to help stabilize the price of cooking oil in 1973 when the prices of coconut oil increased very sharply. But it evolved into a revenue-generating measure collected by the private sector with approval from the government for the next 10 years.

Exchange rate policy. The CB continued to adopt an independent float of the peso. Wholesale purchases and sales of foreign exchange are made by the CB and authorized agent banks (AABs) at the foreign exchange trading center of the Bankers' Association of the Philippines (BAP).

From March 1986 to August 1987, the peso remained relatively firm and steady. The peso went through a gradual and moderate depreciation from September 1987 to August 1988. Thereafter, the peso depreciated faster, a trend which continued through June 1990. Subsequently, deeper erosion of the peso value was observed in September 1990 despite the fact that the CB participated actively in the foreign exchange market as a net seller obviously to prop up the peso's official worth.

On 1 September 1990, the peso depreciated to P 25.75 per US dollar and the CB set a band around the official rate for commercial foreign exchange transaction (Circular 1251), only to be eliminated by the end of 1990. By December 1990, the exchange rate reached ₱ 28 per US dollar.

Also in anticipation of possible foreign exchange difficulties due to the hostilities in the Persian Gulf, the BAP embarked on a voluntary restraint program aimed to cut back imports by 20 percent on a monthly basis. The commercial banks agreed to follow a system of prioritization in servicing LCs and to contribute about 15 percent to 20 percent of their total foreign exchange receipts to a pool called the "oil pit" from which the oil companies can purchase their foreign exchange requirements to ensure uninterrupted oil supply.

Monetary and financial policy. A generally liberal monetary policy prevailed from 1986 to 1988, to assist the economy in recovering from its deepest recession. The CB lowered reserve requirements on short-term deposit instruments from 23 percent to 21 percent in May and August 1986 and on long-term deposit instruments from 6 percent to 5 percent in December 1986.

The relaxation in monetary policy coupled with the lack of attractive outlets for banks' funds pushed down the average nominal interest rates, which already declined since the end of 1984. Real interest rates improved significantly, however, on account of the pronounced slowdown in inflation.

In October 1986, the CB resumed selling government securities through auction. Previous to this, government securities were sold on a negotiated basis with rates unilaterally determined by monetary authorities. As a complementary move, the sale of CB bills was phased out starting October 20 of the same year. Following these moves, the nominal yields on both CB and Treasury bills exhibited substantial declines from 1986 to 1987.

The 1987 average nominal interest rates on borrowing and lending instruments of banks remained lower than the 1986 levels. Real interest rates declined but remained at positive levels. On a monthly basis, however, market rates showed gradual increases in response to the spiralling inflation rate and the uncertainties generated by an aborted coup attempt in August 1987. The government sector also contributed to the interest rate increases as it stepped up its flotation of securities to finance its budgetary deficit.

By 1988, the nominal interest rates began to rise fueled by inflation, higher foreign interest rates, and the increased domestic financing requirements of the private sector of the economy already moving into a recovery.

Starting in 1989, monetary and credit policies were aimed to curb domestic demand and inflation. Reserve requirements against deposits were increased as follows:

- Within a span of less than five months (June to November 1989), the reserve requirement on deposits and deposit substitute with original maturities of more than 730 days climbed from five percent to 20 percent.
- On 1 September and 5 October 1989, the reserve requirement on deposits and deposit substitutes with original maturities of 730 days or less dipped from 21 percent to 20 percent.
- In March 1990, the reserve requirement on all types of deposits of commercial banks and non-bank financial intermediaries and on demand deposit, long-term time deposit, and deposit substitute liabilities of thrift banks grew from 20 percent to 21 percent. Similarly, the reserve requirement on savings deposit and short-term time deposit liabilities of thrift banks increased from 14 percent to 15 percent and by one percentage point every month thereafter to reach 21 percent.
- In May 1990, the reserve requirement on savings deposits and the deposits with original maturities of 730 days or less of thrift banks was temporarily kept at 17 percent to provide thrift banks with sufficient time to adjust to changes in the reserve requirement.
- In November, the reserve requirement on all types of deposits of commercial banks and non-bank financial intermediaries expanded from 21 percent to 23 percent. Similarly, the reserve requirement on demand deposits and negotiated order of withdrawal (NOW) accounts of thrift banks and rural banks ascended from 21 percent to 23 percent.
- By December, the reserve requirement on all types of deposits and deposit substitutes of commercial banks including universal banks, thrift banks, and non-banks with quasi-banking functions again rose to 24 percent effective December 28, 1990.

Nominal interest rates on CB bills and commercial banks' lending and borrowing increased substantially during the period. Even as the average inflation rate shot up to 10.6 percent in 1989 and 12.7 percent in 1990, all instruments except savings deposits yielded positive real returns.

In agricultural credit, government's involvement in direct lending was terminated as the various loan funds which used to provide the seed fund requirements of lending to specific agricultural activities were consolidated into the Consolidated Agricultural Loan Fund (CALF). The CALF subsequently augmented the resources of agricultural credit guarantee facilities.

A rural bank rehabilitation program started in April 1987 (CB Circular 1143). Rural banks (RBs) became extensive credit conduits for government supported agricultural financing programs from 1974 to the early 1980s; the past due loans and RB's arrears with CB associated with these programs practically incapacitated the RB system by 1985. The rehabilitation package provided for a capital build-up and conversion scheme or plan of payment for rural banks having outstanding arrearages with CB. The scheme was improved further (CB Circular No. 1172) in 1989 to lengthen the plan of payment and conversion scheme of rural banks' arrearages with CB from within 10 years to within 15 years.

Privatization. The government pursued privatization and government corporate reform in recognition of the private sector's primacy in undertaking economic activities and to ease the burden of government-owned and controlled corporations (GOCCs) on the national government coffers.

The privatization program pursued since 1987 involved: a) the divestment of selected GOCCs, b) the disposition by the Asset Privatization Thrust (APT) of the non-performing assets (NPAs) of the government, and c) the phase-out of some non-corporate government activities that can be undertaken by the private sector.

The Committee on Privatization (COP) monitors, oversees, and implements the privatization procedures for GOCCs. By the end of 1990, the President approved the privatization of 123 GOCCs. A total of 67 were actually offered for sale. Of these, 24 were fully sold and 23 were partially sold. Ten GOCCs offered for sale suffered from failed bids, while 10 others were dissolved. About ₱ 6.4 billion was generated from sales. Aside from the 123 GOCCs approved for privatization, five GOCCs were converted into non-profit foundations.

The APT, created in 1987 primarily to clear the government books of bad accounts, handles the disposition of the government's NPAs. The bulk of the assets transferred to the APT came from the state-owned Philippine National Bank (PNB) and Development Bank of the Philippines (DBP).

The GOCC reform program initiated in 1987 also included disposition action other than privatization and conversion into non-profit foundations. By the end of 1990, the President approved the consolidation or merger of 18, the conversion to regular government agencies of 16, and the abolition of 57 GOCCs. The consolidation of 12 was completed; three are partially completed and three are pending. Six GOCCs were regularized while the process is ongoing for seven. The regularization of five GOCCs remains pending. Only 10 were completely abolished; 38 are in the process of being abolished, while the abolition of nine GOCCs has not started.

The year 1987 saw the start of a rehabilitation program for government financial institutions (GFIs) intended to address the huge NPAs then carried by the two major banks (the PNB and the DBP), restore their institutional and financial soundness under new mandates, and institute further reforms to cover the other GFIs.

For PNB, the rehabilitation plan aimed to quickly bring back its profitability as an expanded commercial bank and to make it a candidate for eventual privatization. On the NPA accounts of PNB, a total of ₱ 47 billion assets and ₱ 55.4 billion related liabilities were transferred to the national government as of 31 December 1987. The rehabilitation program for the DBP also focused on restoring its financial and institutional viability and the gradual shift from direct to wholesale lending for development through private banks. As of 31 December 1987, the total assets transferred by DBP to the national government amounted to ₱ 64 billion.

The following measures were also adopted in 1987:

- Fertilizer importation and distribution was privatized.
- The trading of wheat, flour, and soybean meal was privatized.
- The meat importation cartel was disbanded.
- With the liberalization of the export marketing structure, agricultural marketing monopolies such as the United Coconut Mills, Inc. (UNICOM) for coconut and the National Sugar Trading Corporation (NASUTRA) for sugar were dismantled.

Price and wage policy. On prices and wages, the government announced a policy of non-intervention in price and wage-setting but did not strictly pursue this. It continued to issue directives on minimum wages as follows:

- EO 178, signed on Labor Day of 1987, mandated a two-step integration of the cost of living allowance (COLA) into the basic pay. The first integration of the COLA under Wage Order Nos. 1 and 2 took effect on 1 May, integrating ₱ 9 out of the ₱ 17 COLA into the minimum wage. The remaining ₱ 8 was integrated on 1 October under Wage Order Nos. 5 and 6. With full integration, the effective minimum wage rates increased to: ₱ 69.33 for non-agricultural workers within and outside Metro Manila; and ₱58.50 for agricultural workers in Metro Manila and ₱47.12 for agricultural workers elsewhere.

- RA 6640 signed in December 1987 further raised the minimum wage of workers and employees in the public and private sectors by ₱ 10.00 per day, except for non-agricultural workers outside Metro Manila whose daily wage was augmented by ₱ 11.00.

- Effective July 1989, RA 6627 mandated an increase of ₱ 25.00 a day in the minimum wage of all workers in the private sector, whether agricultural or non-agricultural. This round of wage increase of around 39.0 percent was the highest since 1984. Exempted from the wage hike were the following: a) workers in plantation agricultural enterprises with annual gross sales of less than ₱ 5 million in the fiscal year immediately preceding the effectivity of the Act, whose daily wage increased by ₱ 20.00; and b) workers in cottage/handicraft industries, non-plantation agricultural enterprises, retail/service establishments regularly employing not more than twenty employees operating outside the National Capital Region (NCR), whose daily wage was increased by ₱ 15.00.

The Act also provides that the minimum wage rates should be adjusted in a fair and equitable manner, considering existing regional disparities in the cost of living and other socioeconomic factors, and the national economic and social development plans. This law, in effect, prescribes the fixing of minimum wages applicable to regions, provinces, or industries following some criteria as cited in the Act such as: a) the prevailing wage levels and demand for living wages, b) the cost of living and the consumer price index, c) the needs of workers and their families, d) the need to induce industries to invest in the countryside, e) fair return to the capital invested and capacity to pay of employers, f) effects on employment generation, and g) the equitable distribution of income and wealth along the imperatives of economic and social development.

This led to the creation of regional wage and productivity boards -- tripartite bodies with representatives from the government, labor, and employer sectors -- which will prescribe minimum wage increases. Starting October 1990, the regional wage and productivity boards approved the different demands of private sector laborers for higher wages. These wage adjustments ranged from a high of ₱ 17 in National Capital Region (NCR) to only ₱ 1 for Region VII in retail and service establishments employing less than 10 workers. In some regions, the COLA was increased in lieu of a wage adjustment.

Upward adjustments in the salaries of public sector employees also took effect:

- EO 31 issued in 1986 granted two-step salary adjustments which is approximately equivalent to a 10 percent increase.
- In 1987, a series of EOs and MOs granted an increase amounting to five percent of the basic salary for career executive service positions and 30 percent of the basic salary for all rank-and-file employees in specific government agencies.
- RA 6642 further adjusted government compensation by a 10 percent increase in basic salary and an additional ₱ 200.00 COLA.

- RA 6758, otherwise known as the "Wage Standardization and Position Classification Act," took effect on 1 July 1989. This mandated that government personnel should receive equal pay for substantially equal work; it based the varying scales in pay on substantive differences in duties and responsibilities, and qualification requirements of the position. It also raised the basic pay of the lowest paid government employees to not less than ₱ 2,000.00 per month.

Price controls were used widely for basic commodities to stabilize prices after a coup attempt in December 1989, drought in the latter part of 1989, a strong earthquake in July 1990, and fuel price increases in October 1990.

After the attempted coup, EO 383 issued on 5 December 1989 directed the Department of Trade and Industry to impose price ceilings on nine commodities: rice, canned liquid milk, powdered filled milk, sugar, dressed chicken, pork, hard flour, kerosene, and LPG in the NCR. It also provided for other measures as may be appropriate to ensure the availability and reasonableness of the prices of these commodities. The EO was to take effect until the end of December 1989. But the price ceiling regulation was later extended up to 31 January 1990 through NEMO 3 signed on 30 December 1989.

NEMO 7 issued on 22 January 1990 imposed nationwide price ceilings on rice up to 28 February 1990 due to the drought.

On 31 January 1990, NEMO 9 extended to 28 February 1990 the price ceilings on the commodities specified in EO 383, except rice (which was listed in NEMO 7) and chicken (which was stricken off the control list when prices went down).

Two more NEMOs issued on 28 February 1990 extended the maintenance of price ceilings to 31 March 1990. NEMO 11 imposed ceilings on rice nationwide subject to certain modifications, while NEMO 12 imposed ceilings on prime commodities other than rice and chicken in the NCR.

On 29 March 1990, the effectivity of the nationwide price control on rice, as well as on LPG and kerosene in the Metro Manila area, was further extended until 30 April 1990 through NEMO 13 and 14. The price ceilings on milk, sugar, pork liempo, and hard flour were lifted since prices and supplies of the products stabilized.

On 19 July 1990, EO 414 was issued. This imposed price ceilings on five prime commodities -- rice, milk, sugar, canned sardines, and hard flour -- in areas stricken by a strong earthquake that hit Northern Luzon on 16 July 1990.

When fuel prices rose, EO 423 issued on 4 October 1990 reimposed price ceilings on the seven basic commodities specified in EO 383.

Foreign Investment Act. The Foreign Investments Act of 1991 allowed foreign investors as much as 100 percent equity in enterprises except in areas included in a negative list. The foreign investment negative list has three component lists:

- List A enumerates the areas of activities reserved to Philippine nationals by mandate of the Constitution and specific laws.
- List B contains regulated areas pursuant to law and include defense related activities and those which have implications on public health and morals.
- List C contains areas of investments in which existing enterprises adequately serve the needs of the economy.

A transitory negative list will remain in effect for 36 months after the rules and regulations to implement the Act will have been issued. A regular foreign investments negative list will be drawn up and be made effective after the 36-month transitory period. This regular list will be updated but not more often than once every two years.

D. *Policy Features Required in the Model*

The categories of policies reviewed in this paper include trade policies, tax measures, monetary and financial policies, exchange rate policy, privatization, price and wage policies, and investment incentives. Accordingly, the CGE model must incorporate the following trade policies of tariffs, import non-tariff measures, export taxes, and non-tax export restrictions.

For the tax policy, the model must be able to analyze changes in the VAT, the corporate income tax, the tax on passive income, personal income taxes, and excise taxes.

Financial policy reforms include policies that affect changes in the real interest rate. The model has to incorporate savings and investment to enable it to trace the impact of financial policy reforms on resource mobilization and capital formation. Fiscal investment incentives have to be featured in the model to the extent that these influence both the level and allocation of investment resources.

CGE models are well suited to analyze the long-term impacts of changes in economic policies. But CGE models are inappropriate in analyzing the impact of macroeconomic policies on the nominal exchange rate, general price level, and economic activity. A macroeconometric model, which is able to track the impact of macroeconomic policies on these macroeconomic variables, will have to be used.

The interphase between CGE and macroeconometric models has to be established. As is well known, changes in relative prices provide the key to explaining changes in resource allocation, economic efficiency, and distribution of income within such models. Changes in the nominal exchange rate and the general price level are clearly outside the existing theoretical

framework of CGE models. Fluctuations in nominal gross domestic product cannot also be handled within the CGE framework.

However, fluctuations of real exchange rates and gross domestic products can be analyzed within the CGE framework. Since these real variables are computable in macroeconometric models, the modeler can input all these variables and their characteristics into CGE models in order to examine the resource allocation and distributional implications of such macroeconomic variables. Subsequent sections of the paper elaborate on this.

III. EFFECTS OF TRADE LIBERALIZATION MEASURES ON AGRICULTURE

This section illustrates the use of a CGE model to calculate the effects on the Philippine economy of tariff reforms. A review of the studies done regarding tariff reforms is first given, followed by an assessment of the changing trade protection and comparative advantage.
comparative advantage.

The discussions above traced how the Philippine government progressively liberalized its trade policies in the 1980s. Existing studies on these reforms focused on the changes in the tariff structure of the economy. Lee (1984) developed a model which he used to simulate the resource allocation effects of the 1981 tariff reforms. Several joint studies of the Philippine Institute for Development Studies and the Tariff Commission (e.g., Medalla, 1986) also delved into these reforms, except one (de Dios, 1986) which examined the effects of the non-tariff measures in the economy.

A few of these studies examined the role of trade policies in influencing agricultural development. Azarcon (1987) described the tariff policies affecting Philippine agriculture. Seligman (1987) also reviewed these reforms as well as the non-tariff measures affecting the sector.

A more expanded study (Department of Agriculture, 1989) calculated the impacts of tariff reforms on Philippine agriculture. This study concluded that the 1981 tariff reforms proved beneficial to the whole economy, although it noted that agricultural tariffs were cut much larger than non-agricultural tariffs. The study argued that future tariff reforms should aim for the lowering of tariff rates in the non-agricultural sector in order to achieve a more sector-neutral tariff protection regime.

Clarete (1989) applied a general equilibrium model of the Philippine economy in order to quantify the real income gains of both the tariff reforms and the import liberalization. Although the tariff reforms yielded positive real income gains to the Philippine economy, they moved resources out of agriculture toward the non-agricultural sector. This result supports the Department of Agriculture (DA) study which contended that the tariff reforms lifted agricultural tariff protection more and at a faster rate than non-agricultural tariff protection.

Import liberalization had a much larger real income gains compared to tariff reforms, although this result clearly depends upon the assumed tariff equivalent rates of non-tariff measures. The interaction of the tariff and non-tariff measures yielded one interesting result. Lowering tariff rates in the non-agricultural sector as what the DA study recommended actually neutralizes tariff protection, since the binding regulations in the non-agricultural sector are the non-tariff measures. Thus if import restrictions are first removed and tariff rates are lowered in the non-agricultural sector, the real income gains would increase significantly, as argued in Clarete (1989).

Two studies reviewed the recent tariff reforms (Clarete, 1991a; Clarete, 1991b). For EO 413, signed into law in 1990 to cut further the tariff protection in the country, Clarete (1991a) noted that although it proved to be beneficial, much of the policy discussion at that time zeroed in on the large fiscal deficit, and the EO would have involved substantial cuts in tariff revenues. Thus, EO 413 was suspended in 1990. A year later, following a series of policy discussions involving the private sector, President Aquino issued EO 470. Clarete (1991b) examined the impacts of these tariff reforms. Like the defunct EO 413, the EO 470 tariff reforms has since moved the economy toward a more efficient standing; however, maintaining this trend will depend crucially on the way the government manages the exchange rate. Clarete argued that if the exchange rate remains unresponsive to the expected ballooning of the trade deficit, as a result of the tariff reforms, then a BOP problem might lead the country to a situation in which foreign exchange will be rationed, canceling out the real income gains of the tariff reforms.

The export taxes on the country's key export industries was always the subject of intense debate in the Philippines until the government removed them in 1986. A series of industry studies examined the effect of export taxes on the country's key agricultural industries (a summary is provided in David, 1983). These studies utilized the concepts of effective protection rates and domestic resource cost indices to evaluate the impacts of the export taxes, tariff, and other relevant regulations imposed upon different industries. These studies complemented the so-called "green book" written by a team of agricultural policy experts from the University of the Philippines at Los Baños. The latter provided the analytical support to the major policy reforms in 1986, including the lifting of export taxes and dismantling of the agricultural monopolies.

A. *Changing Trade Protection*[6]

The agriculture sector has the lowest effective tariff protection in the economy. Before export taxes were lifted in 1986, many agricultural and agro-processing industries had negative effective tariff protection rates. Bautista, Power, and Associates (1979) and Tan (1979) calculated that in the 1970s primary agricultural industries had an average effective protection rate of about nine percent in contrast to that of manufacturing firms which had 44 percent.

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[6]Some of the material in this section is based on material reported in Chapter 6 of Balisacan, Clarete, and Cortez (1992).

1981 tariff reforms. The tariff reforms introduced in 1981 lowered tariff rates on agricultural products more than those of non-agribusiness products. Table 1 presents the profile of the tariff rates on selected primary and processed agricultural commodities from 1979 to 1996.[7] As a group, food products including food and beverages have the highest tariff rates in the Tariff Code. They are followed by agricultural products which also cover some of the food items included in the food group. The non-food manufactured agricultural products have the lowest tariff rate.

The difference between the 1979 and 1985 tariff rates in Table 1 is due to the 1989 Tariff Reform Program. The program drastically cut the tariff rates of food items and agricultural products compared with non-agricultural products. Government officials involved in designing the program indicated that the cuts were larger on food and agriculture because they have the higher tariff rates.

The minor changes in the tariff rates between 1985 and 1988 reflect the tariff rate adjustments done in 1987 and 1988, to partly compensate producers for the import liberalization measures implemented in the period which did away with import licensing restrictions. These adjustments were not made on the products listed in the Table because their respective import licensing restrictions were not removed by the government. The weighted averages slightly grew between 1985 and 1988 because selected tariff rates were also adjusted downward in these adjustments.

The discrepancy between 1988 and 1991, as reflected in the Table, comes more from the data rather than from a major reform process as in the case of the 1981 Tariff Reform Program, although minor tariff changes occurred between 1988 and 1991. The data used for 1979 to 1988 are based on the 1979 65-sector, IO table while those for 1991 are based on the 1983 127-sector, IO table. A difference exists in the way tariff lines (classified previously under the Customs Cooperation Council Nomenclature (CCCN) and the Harmonized System (HS) for the 1991 tariff rates) are mapped into the IO sectors. These changes need not be as large as the numbers seem to indicate.

Executive Order No. 470. EO 470, issued by President Aquino on 20 July 1991, resulted from a year-long consultation with the private sector conducted by the executive and legislative branches of the government; the consultation was triggered by the issuance of the controversial EO 413 in July 1990, which also ordered cuts in tariff rates. Despite the controversy, EO 470

[7]The averages in the table are computed using geometric weights involving import values and free trade value added in 1983, although simple averages were used in computing the average tariff rate of a given input-output sector.

Table 1
AVERAGE TARIFF RATES OF SELECTED AGRICULTURAL PRODUCTS

I/O Code	Description	1979	1985	1991	1996
1	Irrigated palay	0.70	0.50	0.50	0.50
2	Non-irrigated palay	0.70	0.50	0.00	0.00
3	Corn	0.70	0.50	0.20	0.23
4	Coconut, including copra	0.85	0.35	0.20	0.50
5	Sugarcane	0.70	0.50	0.50	0.30
6	Banana and other fruits and nuts	1.00	0.50	0.50	0.50
8	Root crops	0.46	0.41	0.41	0.28
9	Agricultural services	0.10	0.46	0.46	0.30
10	Other commercial crops	0.31	0.10	0.10	0.03
11	Hogs	0.10	0.34	0.37	0.29
12	Chicken and poultry products	0.64	0.10	0.10	0.21
13	Other livestock	0.57	0.49	0.44	0.28
14	Marine fishing	1.00	0.28	0.23	0.18
15	Inland fishing	0.93	0.28	0.25	0.27
16	Forestry and logging	0.46	0.36	0.32	0.16
17	Crude oil, coal and natural gas	0.17	0.27	0.18	0.13
18	Other mining	0.15	0.15	0.30	0.20
19	Rice and corn milling	0.70	0.11	0.13	0.11
20	Sugar milling and refining	0.70	0.50	0.50	0.50
21	Milk and dairy	0.35	0.50	0.50	0.47
22	Oils and fats	0.43	0.14	0.21	0.20
23	Meat and meat products	0.61	0.35	0.37	0.32
24	Flour milling	0.40	0.30	0.37	0.30
25	Animal feeds	0.36	0.28	0.27	0.27
26	Other foods	0.71	0.20	0.23	0.17
27	Beverage and tobacco	0.72	0.44	0.45	0.34

Source: Tariff Commission, as reported in Balisacan, Clarete, and Cortez (1992).

in its final tariff rates does not differ significantly from EO 413 which it replaced. Only the following differences exist:

- EO 470 provides a five-year adjustment period while EO 413 orders immediate and one-time substantial cuts in the tariff rates. The reforms' phasing helps the private sector adjust to the reforms and the government trim down the fiscal deficit by avoiding an abrupt decline in tax revenues amounting to at least ₱ 10 billion a year.
- EO 470 also eliminated a feature of EO 413 in which the tariff protection of some inputs exceeded that of the output itself.
- A feature of the reforms vital to the private sector is the retention of the 50 percent tariff protection on some two hundred products and the granting of zero and three intermediate levels of tariff protection on others; in contrast, EO 413 had a four-tier tariff structure of EO 413 ranging from three percent to 30 percent.

Under EO 470, the simple average nominal tariff protection rate dropped from 28 percent to 20 percent while the weighted average tariff rate fell from 20 percent to 14 percent. These cuts parallel those made in the 1981 tariff policy reforms. Effective tariff protection rates, thus, dipped from a weighted average of 25 percent to 19 percent at the end of the tariff reform program. With these reforms, the government is currently achieving a sector-neutral effective tariff protection policy.

Table 2 shows the average tariff rates of selected food items under EO 470. The final rates are those listed under the 1996 column. The tariff rates for 1991 reported in this Table and those in Table 1 are not the same because of the nature of the data. The 1991 tariff rate data, as reported in this Table, is based on the 127 IO data. The data reported in Table 1 resulted from mapping a 127-sector, IO data into a 65-sector, IO data. The Tariff Commission also recently modified correspondences between the HS and the 127 IO table classification systems.

Figure 1 depicts the trend in tariff rate changes in the Philippines since 1981. The 1991 tariff reform changes are comparable with the 1981 tariff reforms although the latter program appears to have cut more deeply the country's tariff protection than the former. Food items at the end of the process have an average tariff protection lower than that of agriculture as a whole. The discrepancies between the average tariff protection of all three groups are narrowed down. This shows that the country is moving toward a sector-neutral tariff policy.

Non-tariff measures. The government has been liberalizing its import licensing regulations since 1982 and is presently deciding on doing the same for the remaining items on which non-tariff import restrictions were imposed. Figure 2 shows the non-tariff measures (NTM) coverage ratios for selected sectors in the economy from 1984 to 1990. These ratios are the proportion of Philippine Standard Commodity Classification (PSCC) lines to total which are under some import licensing regulation. A Philippine Standard Commodity Classification (PSCC) line denotes a given commodity. Import liberalization using this index entails cutting down the NTM coverage ratio of a given sector.

Table 2
SELECTED FOOD ITEMS UNDER E.O. 470, 1992-1996
(in percent)

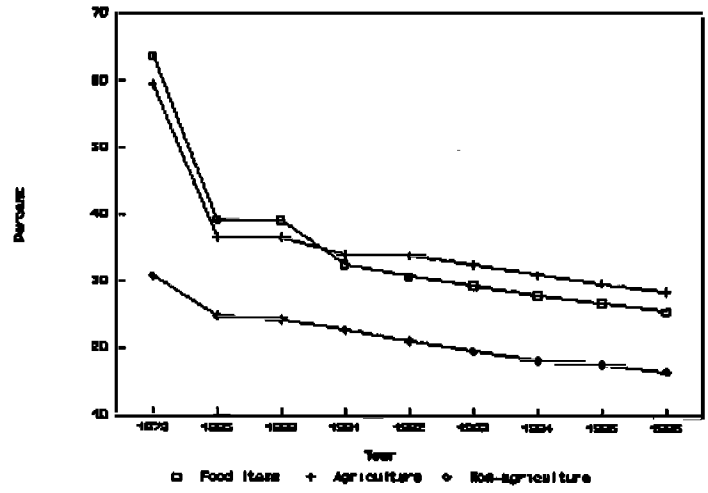
I/O No.	Sector Description	1991	1992	1993	1994	1995	1996
1	Palay, irr.	50	50	50	50	50	50
2	Palay, non-irr.	0	0	0	0	0	0
3	Corn	20	30	28	27	25	23
4	Coconut, copra made in farms	20	50	50	50	50	50
5	Sugarcane	50	50	45	40	35	30
6	Banana	50	50	50	50	50	50
7	Other fruits & nuts	50	50	47	43	40	37
8	Vegetables	41	41	38	35	32	28
9	Rootcrops	46	46	42	38	34	30
12	Coffee and cacao	44	44	40	36	33	30
13	Other comm. crops, n.e.c.	31	28	26	25	24	22
14	Hogs	10	21	21	21	21	21
15	Other livestock & its prods.	23	21	21	20	19	18
16	Chicken for meat	44	38	33	29	28	26
17	Other poultry & its prods	44	46	41	36	33	30
18	Agric'l services	10	3	3	3	3	3
19	Comm. fishing, off and coast	25	32	31	30	28	27
20	In'd fishing & others	32	23	21	20	18	16
28	Rice & corn milling	50	50	50	50	50	50
29	Sugar milling & refining	50	50	49	49	48	47
30	Milk processing	17	16	16	16	16	16
31	Other dairy products	25	28	26	24	23	23
32	Crude coco,veg./anml oils/fats	39	38	36	34	32	30
33	Refined (kg) oil & margarine	34	41	39	37	35	34
34	Slaught'g & meat pack'g plants	24	33	32	31	31	30
35	Meat processing	49	49	44	39	35	30
36	Flour & other grain mill	27	28	28	28	28	27
38	Fruit & veg. preserves	44	47	43	40	36	32
39	Fish preparations	43	46	42	38	34	30
40	Bakery prods. incl. noodles	39	41	37	34	30	27
41	Cocoa prods. & confectionery	46	46	44	41	40	39
42	Coffee, ground or instant	50	50	46	43	39	35
43	Desiccated coconut	50	50	50	50	50	50
44	Ice, except dry ice	50	50	45	40	35	30
45	Misc. food mfs., n.e.c.	38	35	32	30	27	25
46	Wine & liquor	50	50	49	48	47	46
47	Brewery & malt prods.	33	33	33	33	33	33
48	Soft drinks & carbonated water	50	50	45	40	35	30
	Weighted average						
	Selected items	29.44	30.69	29.33	27.97	26.76	25.55
	Agri. prod.	33.18	33.84	32.47	30.97	29.77	28.56
	Non-agri. prod.	23.89	21.05	19.51	18.14	17.70	16.58

Note: The weights used are geometric averages of the free trade value added and import values.

Source: Tariff Commission.

FIGURE 1

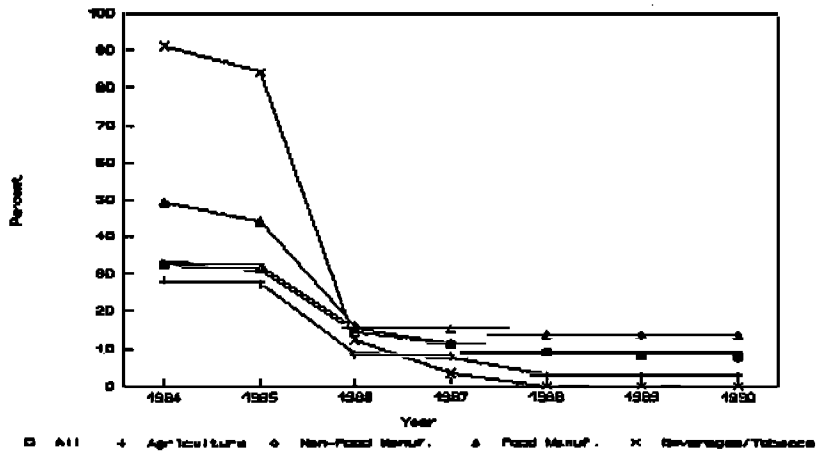
AVERAGE TARIFF RATES IN SELECTED SECTOR GROUPS: 1979-1995



Source of Basic Data: Tariff Commission, as reported in Balisacan, Clarete and Cortez (1992).

FIGURE 2

NON-TARIFF MEASURE COVERAGE RATIOS: 1984-1990



Source of Basic Data: Tariff Commission, as reported in Balisacan, Clarete and Cortez (1992).

The most comprehensive effort in liberalizing import licensing regulations occurred in 1986. The food processing sector has the highest NTM coverage ratio in the economy, followed by the rest of manufacturing. Beverages and tobacco used to have close to a 100 percent NTM coverage ratio but the regulations were removed by the government in 1988.

The book rates of tariff as well as the non-tariff measure coverage ratios do not indicate the actual protection producers receive from a trade policy. Book rates of tariff may be imperfectly enforced resulting in tax evasion and avoidance. Moreover, duty drawbacks are provided by the government to stimulate investments. Some of these tariffs may also be redundant as in the case of many agricultural products that are primarily being exported (e.g., coconut). Non-tariff measures may not also be binding; a 100 percent NTM coverage ratio for a given sector need not reflect that the producers in that sector are very protected by trade policies.

This is why it may be useful to compute the implicit tariff protection as indicated by the domestic and border prices of these commodities. These implicit tariff rates, featured in Table 3, give the effect of both tariff and non-tariff protection on the output, as actually applied. The data from 1985 is sparse and the weighted average of these should be interpreted with caution. Most of the data available since 1985 deal with non-agricultural sectors which are not reported in the Table. Nevertheless,they demonstrate that these implicit tariff protection rates imply a different protection structure than the tariff book rates shown in Table 1.

Figure 3 summarizes the data in Table 3 and relates this to the implicit tariff protection of agriculture and non-food sectors. The figure shows the discrepancy between non-agricultural implicit tariff protection and that for agriculture and food items. Food items appear to have the lowest implicit tariff protection of all three commodity groups. In the 1970s, the difference in protection is even larger.

The figure reinforces what analysts of Philippine policy have been saying all along: that a trade policy bias against the food and agricultural sector exist. Although this policy bias seems to have diminished in recent years, much remains to be done before it is completely eliminated.

Effective tariff protection. The policy bias comes out even more clearly using effective protection rates which is the protection on the value added generated in these sectors (see Figure 4). From 1985 to 1988, hardly any change occurred in the effective protection structure. Comparing these numbers with those before the 1981 tariff reform program which was completed in 1985 (not shown in the figure), one would see that both the level and dispersion of effective protection rates across the various sectors of the economy were already reduced by the government.

The EO 470 is a recent step taken by the government toward a sector-neutral structure of protection. Based on data from the Tariff Commission (1991), the effective tariff protection on agriculture, fishery, and forestry fell by two percentage points under EO 470 while that on manufacturing by seven percentage points, indicating that the reforms are beginning to address the anti-agriculture bias of tariff policies. In mining, the relative effective protection actually increased by one percentage point.

Table 3
NOMINAL PROTECTION RATES OF SELECTED FOOD ITEMS BY COMPARISON, 1977-1988
(in percent)

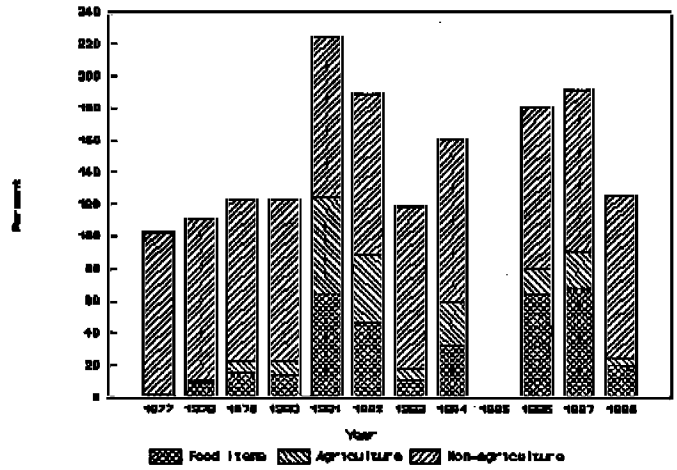
I/O Sector Code	Description	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
3	Corn	-87	50	21	28	53	76	25	63		90	107	60
6	Banana	-51	-26	-22	-42	-43	-42	-49	-49				
7	Other fruits & nuts	-32	-14	4	-13	6	4	-13	-21	-36	20	-87	-90
8	Vegetables	93	27	24	94	64	18	30	74	22	-46	-62	-44
16	Chicken for meat	26	30	44	29	43	25	14	26	46	4	48	13
19	Comm fishing,offshore & coastal	-52	-68	-56	-51	-53	-63	-73	-56		46	116	108
20	Inland & other fishing acts	-50	-46	-40	-18	-80	-78	-81	-75		20	16	29
27	Other non-metallic min & quar	-4	-36	-32	4	35	4	-10	-29		77	90	113
28	Rice & corn milling	16	-6	22	-7	-4	17	-26	15		-36	-50	-29
29	Sugar milling & refining	-29	1	-9	-26	-46	24	10	64		12	28	15
30	Milk processing	7	1	32	22	21	52	34	67				
31	Other dairy products	28	26	30	22	44	75	57	87				
32	Crude coco vegetable oils & fats	-80	1	63	46	51	108	8	41				
33	Refined(cooking) oil & margarine	-31	-9	14	60	308	10	-11	-6				
34	Slaughtering & meat packing plants	12	2	9	28	29	80	44	98				
35	Meat processing	60	59	81	84	85	115	78	120				
36	Flour & other grain mill	57	97	87	77	91	162	111	120				
38	Fruit & vegetable preserves	99	95	98	100	165	-5	-15	-23				
39	Fish preparations	76	-13	-11	-6	77	74	45	52				
40	Bakery products including noodles	52	16	64	94	46	181	153	99				
41	Cocoa products and confectionery	88	72	86	50	-35	103	81	161				
42	Coffee, ground or instant	54	44	69	100	118	-16	-19	4				
43	Desiccated coconut	-29	-47	-25	-18	42	124	51	-4				
45	Misc. food manufactures, nec	18	27	-1	46	16	5	-17	7				
46	Wine & liquor		14	12	16	80	70	36	6				
47	Brewery & malt products		24	46	72								
	Weighted average												
	Selected food items	0.2	15.5	29.5	38.3	38.4	31.5	5.9	19.9	22.2	16.4	20.2	11.8
	Agricultural products	2.2	2.6	14.8	23.9	35.9	28.7	4.3	17.5		3.8	6.7	2.1
	Non-agricultural products	121.9	171.5	197.0	274.0	60.1	67.9	57.6	63.0	4.9	25.4	29.9	57.0

Note : 1. The weights used are geometric averages of the free trade value added and import values.
2. Blank entry means no data available.

Source : Loreli de Dios, Non-Tariff Measures affecting Philippine Imports. Tariff Commission, International Trade Branch, as reported in Balisacan, Clarete, and Cortez (1992).

FIGURE 3

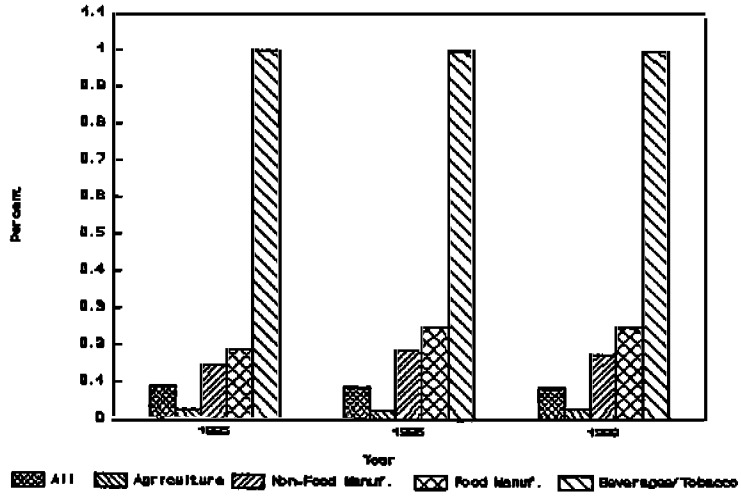
IMPLICIT TARIFF PROTECTION RATES: 1977-1988



Source of Basic Data: de Dios, L. (1986) for data till 1984 and the author for updates since 1985, as reported in Balisacan Clarete and Cortez (1992).

FIGURE 4

EFFECTIVE PROTECTION RATES OF SELECTED SECTORS: 1985-1988



Source of Data: Tariff Commission, as reported in Balisacan Clarete and Cortez (1992).

Recent tariff reforms are also addressing the anti-export bias of tariff policies. At present, importables have an effective tariff protection equal to 47 percent while exportables have -3 percent. When EO 470 is fully implemented, the effective protection on importables would go down to 37 percent while that on exportables would remain the same.

B. *Changing Comparative Advantage*

One of the important arguments used to advocate trade liberalization is to make the economy more efficient. This happens via a reallocation of resources in the economy toward those industries where the country seems to have a comparative advantage. It is, therefore, useful to determine whether this in fact has transpired in the economy using changes in the domestic resource cost which reflects comparative advantage.

In trade theory, comparative advantage is defined as the relative cost advantage of a country in producing goods over another country. This advantage usually comes from the nature and amount of the resources found in the first country, which are used intensively in producing the goods.

In modern day economies, we find that any country produces thousands of goods. Thus, some descriptive statistic becomes necessary to tell us whether or not a specific country has indeed comparative advantage in producing a given set of goods. This study will analyze Philippine agricultural commodities.

The domestic resource cost (DRC) is a measure of comparative advantage. This measure gives the social or shadow cost of resources of earning or saving a unit of foreign exchange. The term "social" refers to the real opportunity cost to society instead of to the private sector of the resources in producing a given commodity. A comparative advantage exists when the DRC is less than the shadow exchange rate or the opportunity cost to society of foreign exchange. If this criterion is satisfied, the DRC would show that the country has a positive net social profit in producing a particular good, indicating that society should promote the production of such a good which conveys additional profits to it.

The DRC is defined as:

$$DRC_j = \frac{\sum_{i=1}^{m} b_{ij}\, s_i}{\overline{p_j^w} - \sum_{i=1}^{n} a_{ij}\, \overline{p_i^w}} \qquad (1)$$

where

1. m refers to the number of domestic resources assumed not traded,
2. n refers to the number of traded inputs,

3. s refers to the vector of shadow prices of domestic resources,
4. $\overline{p^w}$ refers to the vector of given world prices of traded inputs,
5. b_j refers to the vector of domestic resource requirements to produce a unit of the output j, and
6. a_j refers to the vector of traded input requirements to produce a unit of the output j.

Let us define the unit social profitability of producing good j as follows:

$$\pi_j = \sigma\left(\overline{p_j^w} - \sum_{i=1}^{n} a_{ij}\,\overline{p_i^w}\right) - \sum_{i=1}^{m} b_{ij}\,s_i \qquad (2)$$

where σ is the shadow exchange rate. If the profit is positive, this implies that the value to society of saving a unit of foreign exchange by not importing a good more than outweighs the opportunity cost to society of using its domestic resources in producing the import substitute. If the good in question is being exported, then a positive profit implies that the value to society of earning a unit of foreign exchange is more than the social cost of the resources used to earn such foreign exchange.

The link of the unit social profit to DRC is apparent. Dividing the lefthand side of the profit function with the net foreign exchange savings or earnings (the quantity inside the parentheses), the unit profit function becomes:

$$\pi_j = \sigma - DRC_j \qquad (3)$$

Thus, if the unit social profit is positive, indicating that we should promote the activity, then the criterion becomes:

$$DRC_j < \sigma \quad \leftrightarrow \quad \pi_j > 0. \qquad (4)$$

Estimation. The DRCs were estimated using the tariff rates in 1979, 1985, 1991, and 1996. The first set reflects the tariff rate structure before the 1981 tariff policy reforms, which are embodied in the second set of tariff rates. The 1991 tariff rates include the first round of EO 470 tariff reforms, while the 1996 tariff rates contain the EO's entire set of tariff rate reductions. Three sets of IO data were used in these computations: the 1979, 1983, and 1989 (based on the 1985) IO tables. Differences in the DRC indices reveal variations in the IO tables, reflecting, in theory, changes in production technology. Thus, estimates of DRCs were computed, one based on the three IO tables and a second one based on the 1983 IO table. Changes in the DRC/SER also reflect variations of the shadow exchange rate. Three shadow exchange rates were used: the 1979 rate estimated to be ₱ 8.86, the 1983 rate estimated to be ₱ 13.33, and the 1989 rate estimated to equal to ₱ 34.00 per one US dollar. Ultimately, these changes in the DRCs reflect the changes in the economy's protection structure. The following tables describe this information.

Results. Table 4 summarizes the changes in the DRC/SER ratios by major production sectors of the economy, using different sets of IO tables, as described above for 1979, 1985,

Table 4
SUMMARY OF DRC/SER AVERAGES BY SECTORS,
1979, 1985, 1991 and 1996
(First Scenario: Changing Technology)

Description	1979	1985	1991	1996
Agriculture	0.30	0.25	0.08	0.08
Natural resources ind.	0.29	0.19	0.11	0.10
Agricultural processing	2.22	0.85	0.28	0.28
Manufacturing and energy-related projects	1.66	0.76	0.46	0.43
Public utilities/services	0.28	0.16	0.11	0.10

Note: 1979 tariff rates were used for 1979 IO Table based DRC computation.
1985 tariff rates were used for 1983 IO Table based DRC computation.
1991 & 1996 tariff rates were used for the 1989 IO Table based DRC computation.
1979 shadow exchange rate equal to 8.86.
1983 shadow exchange rate equal to 13.33.
1989 shadow exchange rate equal to 34.00.

Source: Author's estimates.

Table 5
SUMMARY OF DRC/SER AVERAGES BY SECTORS
(Using 1983-I-O)
(Second Scenario: Technology held constant)

Description	1979	1985	1991	1996
Agriculture	0.39	0.25	0.09	0.10
Natural resources ind.	0.41	0.19	0.08	0.08
Agricultural processing	1.86	0.85	0.43	0.40
Manufacturing and energy-related projects	1.19	0.76	0.30	0.32
Public utilities/services	0.24	0.16	0.07	0.07

Note: 1979 shadow exchange rate equal to 8.86.
1983 shadow exchange rate equal to 13.33.
1989 shadow exchange rate equal to 34.00.

Source: Author's estimates.

1991, and 1996. For the 1979 tariff rates, the 1979 IO table was used. The 1983 IO table was employed for the 1985 tariff rates. The remaining sets of tariff rates were applied on the 1989 IO table.

Agriculture's comparative advantage seems to have improved in response to the tariff policy reforms. The DRC/SER ratios fell from .3 before the reforms to .08 in 1991. The agricultural processing sector substantially improved in its comparative advantage. Its DRC/SER ratio declined from 2.22 in 1979 to 0.28 in 1991. Based on these numbers, the tariff reforms apparently increased the efficiency of agriculture, both in its primary and processing stages.

The other areas of the economy also improved their respective comparative advantage. The non-agricultural manufacturing sector's DRC/SER ratio dropped from 1.66 in 1979 to 0.46 in 1991 and finally to 0.43 in 1996. The same pattern occurred in public utilities and services as well as in the natural resources sector.

The DRC/SER ratio changes single out primary agriculture as the economy's more productively advantageous areas where resources should be moved into. Its DRC/SER ratios are significantly smaller compared with those of either manufacturing and the agricultural processing sub-sector. This is expected, considering that primary agriculture has more value added compared to non-agricultural manufacturing and agricultural processing.

But the development of primary agriculture hinges on a more efficiently run agricultural processing sub-sector which buys its products. The DRC/SER ratio of agricultural processing was greater than one in earlier years, implying that its products are internationally competitive. But without a sufficient market for processed agricultural products such as food and beverages, the primary agricultural products will not sell in larger and larger volumes. However, the tariff reforms seemed to increase the comparative advantage of this sub-sector, indicating a policy support for it.

A significant decline in the DRC/SER ratios also occurred between 1985 and 1991; this is due to the increase in the shadow exchange rate between these periods. The SER used in the 1984 computations was 13.33 while that for 1991 was 34.00. This implies that between these periods the domestic currency was seriously overvalued. If we used the same exchange SER as that for 1983, then the DRC/SER ratios for 1991 would not have been as low as reported in the Table. This indicates that a policy of overvaluing the domestic currency erodes the comparative advantage of the economy in general.

Table 5 depicts a similar change pattern in the DRC/SER ratios based on computations using only the 1983 IO table. Tables 6 and 7 present the sectoral details of the DRC changes for only the primary and processed agricultural products.[8]

[8]Results for the non-agricultural sectors are available but not reported in this paper.

Table 6
DOMESTIC RESOURCE COST ESTIMATES
for 1979, 1983, 1991 and 1996
(Using the corresponding I-O Table for 1979, 1983, and 1985)

I/O Code	Description	1979	1985	1991	1996
1	Irrigated palay	3.95	2.52	2.19	2.14
2	Non-irrigated palay	1.42	1.05	1.29	1.26
3	Corn	2.00	1.31	1.33	1.31
4	Coconut, including copra	1.18	1.32	0.49	0.50
6	Banana & other fruits	2.42	1.34	2.42	2.38
7	Vegetable	0.91	0.80	1.27	1.24
8	Rootcrops	0.81	0.81	1.12	1.07
9	Agricultural services	1.14	0.89	2.04	1.94
10	Other commercial crops	0.99	1.03	2.08	1.99
11	Hogs	5.55	12.61	6.61	6.48
12	Chicken and poultry products	7.45	11.64	9.84	9.31
13	Other livestock	3.87	5.30	3.62	3.46
14	Marine fishing	5.30	3.94	2.98	2.87
15	Inland fishing	2.27	1.36	3.46	3.35
16	Forestry and logging	1.67	1.72	2.10	2.03
17	Crude oil, coal and natural gas	1.56	2.97	4.88	4.69
18	Other mining	2.21	2.36	4.93	4.72
19	Rice and corn milling	12.14	8.16	6.20	6.25
20	Sugar milling and refining	5.55	4.16	4.06	3.58
21	Milk and dairy	13.25	9.68	7.22	6.99
22	Oils and fats	7.24	14.61	8.88	9.45
23	Meat and meat products	48.68	14.12	19.55	20.49
24	Flour milling	18.57	18.11	4.91	4.59
25	Animal feeds	15.18	9.01	11.59	11.26
26	Other foods	29.18	16.90	6.36	6.18
27	Beverages and tobacco	27.27	7.80	17.57	16.82

Source: Author's estimates.

Table 7
DOMESTIC RESOURCE COST ESTIMATES FOR 1979, 1985, 1991 AND 1996
(Using only the 1983 I-O Table)

Sector	Description	1979	1985	1991	1996
1	Irrigated palay	3.02	2.52	2.72	2.84
2	Non-irrigated palay	1.18	1.05	0.72	0.73
3	Corn	1.52	1.31	1.07	1.13
4	Coconut, including copra	1.70	1.32	1.23	1.47
6	Banana & other fruits	1.79	1.34	1.37	1.40
7	Vegetable	2.80	0.80	0.81	0.75
8	Rootcrops	0.81	0.81	0.83	0.75
9	Agricultural services	0.88	0.89	0.89	0.85
10	Other commercial crops	1.01	1.03	1.09	1.05
11	Hogs	10.14	12.61	12.06	16.71
12	Chicken and poultry products	11.71	11.64	10.47	9.07
13	Other livestock	6.59	5.30	4.90	4.73
14	Marine fishing	9.04	3.94	4.06	4.51
15	Inland fishing	1.95	1.36	1.32	1.17
16	Forestry and logging	1.97	1.72	1.65	1.64
17	Crude oil, coal and natural gas	2.94	2.97	3.83	3.63
18	Other mining	2.42	2.36	2.55	2.63
19	Rice and corn milling	9.09	8.16	17.66	17.92
20	Sugar milling and refining	4.68	4.16	4.38	4.78
21	Milk and dairy	11.37	9.68	10.91	11.33
22	Oils and fats	11.33	14.61	19.22	13.47
23	Meat and meat products	44.73	14.12	20.47	15.94
24	Flour milling	27.48	18.11	19.56	24.25
25	Animal feeds	9.61	9.01	13.77	11.51
26	Other foods	21.25	16.90	18.94	14.43
27	Beverages and tobacco	8.95	7.80	7.72	7.93

Source: Author's estimates.

C. *Model Simulation: EO 470 Effects Using a CGE Model*

This section illustrates a possible use of a CGE model in calculating the effects on the Philippine economy of the EO 470 tariff reforms. The model is described in Clarete (1991b). It is a 20-sector model of the Philippine economy developed for the Tariff Commission.

The economic effects are obtained by introducing the EO 470 tariff rates into the calibrated model and computing the counterfactual general equilibrium prices and quantities corresponding to the tariff reforms using an algorithm called MPS/GE (Rutherford, 1988). This study focuses on the production and foreign trade impacts of the tariff reforms, assuming that the real exchange rate is fully flexible. Other effects can also be computed in this exercise such as the impacts on domestic absorption and prices of commodities and factors of production.

A summary effect of tariff reforms, consisting of the change in aggregate real income of the economy including its components, is then calculated including the effect on tariff revenues of the tariff reforms.

Although results are reported on a year-by-year basis in Clarete (1991b) since EO 470 is a five-year tariff reform program, the impact of the final rates are reported below for the purposes of this study.

Effects on local production. Table 8 describes the effects of the tariff reforms on local production under a flexible exchange rate policy. The units of the benchmark amounts of production are in thousands. The amount of production of crops, for example, is 151.8 billion units. The unit is defined as that which fetches a price of one peso in 1989.[9] The large sectors in the model include crops, food, and services. Food and agriculture -- made up of crops, livestock and poultry, and fishery -- comprise a large sector in the Philippine economy. In non-agricultural manufacturing, the larger sectors are textiles, wood and paper, chemicals, and electrical machinery.

Local production, as defined in the model, consists of the total resources allocated to a given local production sector. This sector, in turn, has a production transformation function on the import substitutes and exportables produced by the sector. Thus, if local production increases, the output of import substitutes goes down but at a rate less than the increase of export production. The numbers discussed in Table 8 refer to local production of exportables and import substitutes.

The production of crops and other primary commodities rose slightly. More crops, livestock, and fishery products were produced in the economy as a result of the tariff reforms. The magnitudes, however, are small -- less than a percent. The size of the effect depends upon the nature of the key parameters in the model, which in this case would be the extent of

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[9] This is the so-called Harberger convention used to extract price and quantity data from a single information based on the values or expenditures. These are artificial units and do not have any correspondence with the real-life units of the commodities.

Table 8
LOCAL PRODUCTION EFFECTS OF E.O. 470 TARIFF REFORMS
(in percent)

Model Sector	Benchmark Data (in thousand units)	
1 Crops	151,803,000	0.16
2 Livestock and poultry	1,533,400	0.09
3 Fishery	61,939,100	0.26
4 Forestry and logging	18,268,500	0.17
5 Mining	23,349,200	1.20
6 Coconut & veg. oil manf.	46,066,000	0.46
7 Animal feeds manufacturing	25,722,300	-0.14
8 Food, beverages & tobacco	263,769,000	0.12
9 Text. app., ftwr & leather	89,379,000	1.10
10 Wood, paper & rubber	64,844,800	0.49
11 Chemicals	42,778,100	-0.17
12 Petroleum refineries	43,342,800	-0.91
13 Non-metallic min. prods.	14,105,200	0.18
14 Basic metal industries	33,052,000	0.79
15 Fabricated metal products	14,845,200	-0.32
16 Machinery exc. electrical	7,644,080	0.30
17 Electrical machinery	35,329,800	4.25
18 Transport equipment	4,020,080	-0.37
19 Miscellaneous manufactures	6,589,570	-1.03
20 Services	764,300,000	-0.34

Source: Clarete (1991b); Table 10.

substitution between locally made goods and imported products. Clarete (1991b) assumed an elasticity of one for all sectors which is rather small, explaining the small magnitudes of the impacts. In a study for the APEX model, Warr and Kapuchinsky (1992) estimated econometrically these elasticities, and many of the estimates exceeded one.

As a whole, agriculture tended to expand because of the tariff reforms. Crops, being the largest of its components, stand to gain the most resources. Forestry and mining also come out as gainers in resources. Forestry outputs increased by 0.17 and mining by 1.20 percent. These numbers support what the Tariff Commission contended in its paper that the problem of the anti-agriculture bias of tariff policies has been addressed in a significant way by these reforms.

The output of most of the manufacturing sub-industries also increased as a result of the tariff reforms. Food, beverages and tobacco — a large sector in the model — expanded by 0.12 percent. However, feeds production went down by -0.14 percent as a result of these reforms. This loss of the agribusiness sector was more than offset by the gains in resources in food, beverages and tobacco, as well as in vegetable oils and fats sub-sectors.

Even if the impacts of these tariff reforms on the non-agricultural sectors of the economy are not discussed here, Table 8 clearly shows the potential of CGE models in tracking down the effects of macroeconomic policies on key sectors of the economy.

Table 9 shows the impacts of the tariff reforms on the volumes of imports and exports of the economy. Again focusing on the agricultural sector, more imported crops will be coming into the country due to the tariff reforms. This is interesting considering that the crops sector is significantly made up of rice and corn. This number likely reflects increased importation for these two commodities.

The imported processed agricultural products tended to rise, as the Table shows. Imported food, beverages and tobacco went up by 1.25 percent. We recall that production of animal feeds went down, as the results in Table 8 indicate. The decline was made up by increased importation of animal feeds, 1.25 percent.

As agricultural imports rose, so did agricultural exports. Crop exports increased by 0.84 percent, livestock exports climbed by 0.89 percent, and fishery exports grew by 1.03 percent as a result of the tariff reforms. Exports of processed agricultural products also expanded.

D. *Inputs for Modelling Structure*

The above discussion illustrates what a CGE model can do in quantifying the impacts of tariff reforms on the agricultural sector. Again emphasized here is that the results of the model simulations clearly depend upon the assumed behavioral parameters of the model which can be econometrically estimated. To also pursue a more disaggregated analysis of the microeconomic effects of tariff or trade policy reforms, all that needs to be done is to restructure the model to incorporate more sectors. A modelling exercise along this line seemed to have been accomplished by the APEX project. The extent of disaggregation is described in Clarete and

Table 9
EFFECTS ON IMPORTS AND EXPORTS OF EO 470 TARIFF REFORMS
(in percent)

Model Sector	Benchmark Imports Data (in thousand pesos)		Benchmark Exports Data (in thousand pesos)	
1 Crops	12,319,900	0.78	11,410,600	0.84
2 Livestock and poultry	378,503	4.31	11,508	0.89
3 Fishery	928,982	3.24	7,640,800	1.03
4 Forestry and logging	758,891	2.81	225,923	1.05
5 Mining	8,151,720	-2.33	10,786,500	1.95
6 Coconut & veg. oil manf.	640,593	1.31	10,042,400	1.24
7 Animal feeds manufacturing	4,630,900	1.25	1,402,100	0.87
8 Food, beverages & tobacco	9,917,360	1.25	11,361,100	0.90
9 Textile, app., ftwr & leather	13,967,600	5.72	17,562,100	2.87
10 Wood, paper & rubber	8,755,740	1.56	15,919,700	2.06
11 Chemicals	30,780,100	1.41	7,124,640	1.43
12 Petroleum refineries	34,684,200	1.94	3,013,650	0.43
13 Non-metallic mineral prods.	2,167,720	-0.66	1,081,320	1.37
14 Basic metal industries	22,045,800	1.08	10,453,300	1.32
15 Fabricated metal products	3,896,950	1.00	422,319	0.73
16 Machinery except electrical	21,653,200	3.66	1,656,780	1.39
17 Electrical machinery	16,774,000	4.71	20,927,300	5.71
18 Transport equipment	17,382,600	2.66	1,125,930	1.46
19 Miscellaneous manufactures	14,727,500	0.15	1,933,200	0.26
20 Services	28,694,800	-2.00	108,480,000	0.92

Source: Clarete (1991b) Tables 12 and 13.

Warr (1992). However, the project can look into other ways of disaggregating the sectors of the economy such that the extent of details being asked for by policy makers is incorporated.

Note that the model did not report any effects on income distribution. Clarete (1991b) did not examine the distributional effects of tariff reforms, although CGE models can also undertake this type of analysis. In fact, other models have gone into incorporating several consumers in their respective structures (e.g., see the APEX CGE model in Clarete and Warr, 1992; and Habito, 1984).

IV. AN ANALYSIS OF THE VALUE ADDED TAX[10]

This section attempts to quantify the possible impact of the VAT (and a variation of it) on agricultural processing. Clarete (1991) argued that the VAT in the Philippines inadvertently taxes the value added in agro-processing more than in the rest of the economy. This is due to two features in the Philippine VAT law: exempting the primary agricultural sector whose products are substantially used in agro-processing activities and providing a credit method of collecting the tax. These features discourage investments and resources from moving into agro-processing and pose a significant obstacle to agro-based industrialization in a developing country such as the Philippines.

A. *Effective VAT Rates*

The alleged bias of the VAT against agro-processing may be cast formally as follows:

Let X be the volume of processed agricultural product and a_i the amount of intermediate 'input i required to produce a unit of output j. Let p and w be the VAT-inclusive prices of output X and inputs, respectively.

The value added (V) net of the VAT is computed as:

$$V = p'X - \sum_{i=1}^{N} a_i w_i' X \tag{5}$$

where p' and w' are VAT-deflated prices. To simplify the discussion, let us assume that there are no other indirect taxes.

If the VAT has a uniform rate (t) and allows no exemptions, then the amount of revenues the government collects from this tax is calculated as follows:

$$\begin{aligned} R &= \frac{t}{(1+t)} \left[pX - \sum_{i=1}^{N} a_i w_i X \right] \\ &= \frac{t}{(1+t)} pX - \frac{t}{(1+t)} \sum_{i=1}^{N} a_i w_i X \\ &= \textit{output VAT} - \textit{input VAT} \end{aligned} \tag{6}$$

[10] The discussion in this section is based on Clarete (1991).

This is what Tait (1988) calls the subtractive indirect and alternatively the invoice or credit method of collecting the VAT.[11] This method corresponds to the original model of the European Economic Community for collecting the VAT and is used in many other countries.

The effective VAT (t^*) rate is easily calculated by dividing (6) with (5). That is, t^* is equal to the book rate t.[12]

Suppose that intermediate input N was VAT-exempt. Then, the VAT paid to the government by a user of input N is:

$$R = \frac{t}{(1+t)} \left[pX - \sum_{i=1}^{N-1} a_i w_i X \right] \tag{7}$$

Note that the sum operator is running from input 1 to n-1, rather than from 1 to n. The effective VAT rate in this case is now equal to:

$$\begin{aligned} t^* &= \frac{R}{V} \\ &= t \left[p'X - \sum_{i=1}^{N} a_i w_i' X \right] \\ &= t(1+\alpha) \\ &\geq t \end{aligned} \tag{8}$$

where

$$\alpha = \frac{a_N X w_N}{V} > 0. \tag{9}$$

The non-neutrality of the VAT is more serious the larger α is. This point is the heart of the argument why the present method of collecting the VAT, combined with the exemption granted to primary agricultural products, provides a disincentive to agricultural processors. VAT's non-neutrality is all the more heightened by the high primary agriculture content of agricultural processing activities.

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[11]Tait mentions three other ways of collecting the VAT: the additive-direct or accounts method or t^*(factor payments), the additive-indirect method or t(wages) + t(profits) + t(payments to other factors), and the subtractive direct method also called an accounts method or t(output-input costs).

[12]If the VAT revenue is divided by the value added gross of the VAT, then the effective VAT rate would have to equal to $t/(1+t)$.

Table 10 gives the effective VAT rates for key sectors of the economy. The basic data used in these computations is the 1983 IO data of the Philippine economy, consisting of 126 sectors. This computation assumes that the VAT exempt sectors are the primary sectors including farming, fishing, logging, fertilizers, pesticides, herbicides, and petroleum products.[13]

Agricultural processing has the highest effective VAT rate at 22.28 percent, followed by the services sector. While VAT-liable sectors other than agro-processing may also use VAT-exempt intermediate inputs, the inadvertent bias against them are not as serious as in agro-processing. The effective VAT rate for the non-agricultural processing sectors are not substantially higher than 10 percent. This is because the proportion of VAT-exempt intermediate inputs in these other sectors is small compared with that in agricultural processing.

B. *The Automatic Input VAT Credit*

To correct the discrepancy in effective VAT rates due to the VAT collection mechanics and the primary sector exemption, the study suggests a policy measure wherein all agricultural processors, i.e., producers who purchase primary agricultural products as raw materials, receive a credit equal to 10 percent of the cost of VAT-exempt raw materials. This method computes the VAT as the difference between the output VAT less input VAT, and less the input VAT credit.

As a tax credit, the automatic input VAT credit (AIVC) offsets the bias against producers who use VAT-exempt inputs. Formally, the proposal to correct the bias against agro-processor computes the VAT as follows:

$$R = \textit{output VAt} - \textit{input VAT} - \textit{AIVC} \tag{10}$$

The AIVC is a note which tells the tax collector of the Bureau of Internal Revenue to deduct from the tax liability of the agro-processor (or any other producer in the same situation) an amount equal to:

$$AIVC = tw_N' a_N X \tag{11}$$

where N refers to the intermediate input which is exempted from the VAT. If incorporated, the AIVC will equalize the effective VAT rate in all VAT-liable sectors and equate this to the legal rate. Since a_i's are observable, the proposal can be operationalized.

[13] There are more VAT-exempt products according to Section 104 of the National Internal Revenue Code but the above would constitute the significant exemptions in the VAT system.

Table 10
SIMPLE AVERAGE VAT RATES
by Key Sectors (%)

	Book Rate	Effective Rate	Percent Deviation
Primary sectors	1.85	2.12	2.63
Agricultural processing	10.00	22.28	122.81
Industry	9.35	12.34	29.92
Services	10.00	12.55	25.49

Table 11
PRODUCTION AND PRICE EFFECT
OF THE INPUT VAT CREDIT (%)

Sector	Production	Producer Prices
Farming	-0.10	0.00
Other primary	-0.08	0.00
Milling	1.38	0.00
Food, beverages	3.25	0.00
Manufacturing	-0.20	0.00
Other industry	-0.08	0.00
Services	-0.34	0.00

C. *Economic Impact of the AIVC*

The estimated effective VAT rates were used in the CGE analysis. A seven-sector CGE model of the Philippine economy, designed to analyze VATs, characterizes the CGE simulation. A description of this model appears in the last section of this study.

Table 11 provides the production and price effects of introducing the input VAT credit, calculated according to the CGE model. Except in milling as well as in food and beverages, the production in all sectors declined. Production of food and beverages increased by 3.25 percent while that of milling activities rose by 1.38 percent. Production declines, however, are marginal ranging from 0.08 for other primary and other industry sectors to 0.34 for services.

Prices did not change with the policy reform. This result supports the study's contention on the additional VAT taxes collected by the government from agro-processors. In contrast to the official line which states that such additional VAT revenues are shifted back by agro-processors to primary agricultural producers, this paper argues that agro-processors are in fact prevented by competition with imports from doing so. The over-taxation of value added in agro-processing does not change the prices of the primary products concerned, these being determined by the given world prices and the import taxes that apply.

Since all primary agricultural products are importables in this model, the result obtained with respect to prices is consistent with the argument that the binding policy defining producer prices of importables will be the import restrictions. Since these did not change in the simulation, no changes in prices were thus observed.

Since agro-processors are prevented from shifting back the additional VAT revenues collected from them by the government, these additional VAT revenues will certainly be made at the expense of factor earnings and, in particular, of any fixed factors in agro-processing. Table 12 gives the effects on factor prices of introducing the input VAT credit. As expected, the unit profits going to fixed factors in the two agro-processing sectors of the model increased by 2.48 percent and 4.38 percent, respectively.

The numbers in Table 12 confirm the argument that, if left uncorrected, the inadvertent bias in implementing the VAT against agro-processors will distort the pattern of investments in the economy away from agro-processing activities. It is, therefore, imperative that this VAT distortion be corrected in order to encourage investments to move to the agribusiness sector.

Table 13 shows the net effect on real income resulting from the use of the input VAT credit. A reallocation of resources in favor of agribusiness sectors occurred at the expense of the other sectors in the economy. The policy reform also entailed a loss in tax revenues of the government.

The CGE model attempted to compute the net change in real income in the economy resulting from the policy reform. Consumers gained a real income equal to ₱989.85 million while the government lost ₱602.36 million. This loss in tax revenues amounted to about 11 percent of the total VAT yield in 1988 or .09 percent of the benchmark national income. As net effect, the national real income increased by ₱387.49 million or .05 percent of the base case national income.

Table 12
EFFECTS OF FACTOR PRICES
OF THE INPUT VAT CREDIT (%)

Factor	
Labor	0.01
Variable capital	0.09
Fixed factors	
Farming	-0.10
Other primary	-0.08
Milling	2.48
Food, beverages	4.38
Manufacturing	-0.20
Other industry	-0.08
Services	-0.34

Table 13
REAL INCOME CHANGE ASSOCIATED WITH THE INPUT VAT CREDIT
(in million pesos, 1988 prices)

Agent	Benchmark	Percent of Income
Consumers	989.85	0.14
Government	-602.36	-0.09
Net effect	387.49	0.05

V. CURRENCY DEVALUATION EXPERIMENTS[14]

This section reports the findings of a CGE model of the Philippine economy, simulating the economic impacts of currency devaluation.

Clarete (1991c) measures the economy-wide effects of devaluing the Philippine currency. The CGE model includes a monetary sector highlighting the transactions demand, a fixed supply of money, and a foreign exchange rationing mechanism. The model characterizes a small, open economy and distinguishes goods by place of origin.

The features built into this model are meant to enable it to calculate the following economic impacts: prices, resource allocation, production, trade flows, consumption, fiscal and trade deficits, and economic welfare of policy measures. Aside from economic impacts, the model also aims to contrast the alternative strategies of devaluing the currency and reducing the country's money supply. Currency devaluation tends to encourage expenditure switching while decreasing money supply reduces aggregate spending to solve the imbalance in the country's external payments.

The model is calibrated to the benchmark year of 1989. The IO data used in this study came from the 1985 IO survey (yet to be published by the National Statistics Office). The 1985 IO table was updated to 1989 using value added ratios for 1985 and 1989. Since 1985 was a recession year, the data on final demands and trade flows were separately estimated, with reported final demands reflecting the recessionary situation of the economy. However, no independent estimate was made for the inter-industry and value added transactions since these are more linked to production technology rather than to the level of aggregate spending prevailing in the year the survey was made.

The model has 12 production sectors: crops; livestock; fishery; resource industries; agricultural processing; textile, apparel, and leather; wood and paper products; chemical products; other industries; construction and utilities; production-related services; and other services.

Description of Model Simulations

The study analyzed how much the currency is overvalued because of foreign capital flows into the country, which serve as substitute for export earnings in paying for the country's growing trade deficit. It also tried to estimate how much the currency was overvalued because of the country's tariff protection policies.

The exercise's central result stresses that the exchange rate has to be devalued by about 20 percent in order to eliminate the trade deficit. The capital inflows accommodated the country's trade deficit. Export earnings continued to lag behind the country's growing import

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[14] The discussion in this section is based on Clarete (1991c).

bill because of the foreign capital inflows. Most of these inflows came in the form of new long-term loans and official development assistance.

If the equilibrium exchange rate is now ₱ 28 to a US dollar, the exchange rate would have to be about ₱ 34 to a US dollar in order to generate enough export earnings to eliminate the trade deficit. The higher rate will cut down unnecessary imports, thus facilitating the elimination of the trade deficit. In 1989, this came close to ₱ 50 billion or over US$ 2 billion.

Table 14 presents the effects of devaluation on local production. Most production gains went to the non-agricultural sectors. As stated earlier, local production activities in the model produced both the import substitute and the exportable. This was modelled through the product transformation function. Thus, the fact that the devaluation helped the production of the non-agricultural sectors may simply reflect another fact: that the high value exports were the non-traditional, and import intensive, non-agricultural sectors. Except for mining and fishing, all primary sectors tended to have lower production as a result of the currency devaluation.

The results in Table 14 merely confirms that, as of 1989, non-agricultural sectors produced the country's top exports and undertook intensive importation. With the devaluation, imports contracted and were substituted by domestic products; exports also increased. Both effects required substantial increases in production in the local industries. The production decline in primary sectors was a short-run phenomenon. Resources did not increase from devaluation; they were shifted away from agricultural to non-agricultural sectors. In reality, the country has a lot of surplus resources, particularly in agriculture, although these are not captured in the present version of the model. Because of these unused resources, it is very likely that the production decline in the primary sectors may not occur as more and more of the unused resources get employed as a result of the devaluation.

Table 15 shows the effects of the devaluation on the volume of imports and exports. Obviously, imports dropped and exports rose. The import substitution process appeared stronger in agriculture. Its imports went down at a faster rate than those in industry. This may be explained by the relative import intensity of industrial exports. To generate exports, the industrial producers had to import materials and this moderated the decline in the import bill from the industrial sectors. Note that these percentage increases were applied on an import base which is larger for industry than for agriculture. Imports of resource industries did not fall as much as those in other sectors because of the crude petroleum requirements of the economy.The fact remains, however, that industrial exports surged at a faster rate than those in the agricultural sectors.

Adding up the percentage changes in imports and exports, one gets the percentage contribution of the sector to reduce the trade deficit. The trade deficit contribution of the sector is the net imports of that sector. The change in the sector's trade deficit is the sum of the percentage decline in imports, minus the percentage increase in the exports. Based on this index, the agricultural sectors helped relatively more in reducing the country's trade deficit than the industrial sectors. Again, this may be explained by the relative import intensity of industrial exports.

Table 14
PRODUCTION EFFECTS OF DEVALUING THE CURRENCY
TO ELIMINATE THE TRADE DEFICIT
(in percent)

Code	Description	
1	Crops	-1.01
2	Livestock and poultry	-3.28
3	Fishery	-2.09
4	Resource industries	6.40
5	Agricultural processing	-2.65
6	Textile, apparel & leather	3.99
7	Wood, paper & rubber	5.32
8	Chemicals	4.95
9	Petroleum products	1.61
10	Machineries & transport equipment	11.62
11	Other industries	6.41
12	Services	-0.59

Source: Clarete (1991).

Table 15
EFFECTS ON REAL TRADE FLOWS OF DEVALUING THE CURRENCY
TO ELIMINATE THE TRADE DEFICIT
(in percent)

Code	Description	Imports	Exports
1	Crops	-14.36	11.22
2	Livestock and poultry	-15.97	11.32
3	Fishery	-17.46	10.39
4	Resource industries	-6.50	13.18
5	Agricultural processing	-16.88	10.85
6	Textile, apparel & leather	-11.86	14.61
7	Wood, paper & rubber	-10.91	14.85
8	Chemicals	-7.20	13.36
9	Petroleum products	-8.16	10.48
10	Machineries & transport equipment	-11.57	17.42
11	Other industries	-2.72	12.01
12	Services	-13.75	10.39

Source: Clarete (1991).

Assuming the presence of tariff distortions, the exchange rate had to be devalued by about 11 percent if tariff policies were to be removed; exports also needed to be increased to pay for the large import bill induced by tariff liberalization. If the exchange rate now is ₱ 28 to a US dollar, then the tariff protection policies in the country overvalued the domestic currency by about ₱ 3.

The above analysis was undertaken while holding the amount of capital flows constant. If these flows were lower, then the tariff protection policies would have implied a larger distortion in the domestic value of the currency.

The welfare levels of the consumers and government were also controlled in the analysis. The result is utility-compensated. The removal of the tariff restrictions enhanced the overall efficiency of the economy since the latter is a price-taker in world markets. The efficiency gains of such a liberalization measure were, therefore, taken away from the consumers in this utility-constant analysis.

The economic effects of the devaluation are similar in nature as those in the first case of correcting the trade deficit (see Tables 16 and 17). Key differences included the following: a) imports went up instead of contracting, as in the first exercise on the trade deficit; b) import prices declined reflecting the removal of sector-specific tariff rates; c) the increase in exports was not as much as in exports in the trade deficit simulation because of the capital flows; and d) part of the trade deficit was still accommodated by the capital flows in this second exercise involving tariff restrictions.

Table 16
PRODUCTION EFFECTS OF DEVALUING THE CURRENCY
OVERVALUED BY TARIFF RESTRICTIONS
(in percent)

Code	Description	
1	Crops	-1.64
2	Livestock and poultry	-1.22
3	Fishery	-1.02
4	Resource industries	0.80
5	Agricultural processing	-0.89
6	Textile, apparel & leather	2.95
7	Wood, paper & rubber	3.62
8	Chemicals	0.06
9	Petroleum products	-1.00
10	Machineries & transport equipment	14.92
11	Other industries	0.81
12	Services	-0.18

Source: Clarete (1991).

Table 17
EFFECTS ON REAL TRADE FLOWS OF DEVALUING THE CURRENCY
OVERVALUED BY TARIFF RESTRICTIONS
(in percent)

Code	Description	Imports	Exports
1	Crops	14.25	2.30
2	Livestock and poultry	14.74	2.68
3	Fishery	11.44	2.39
4	Resource industries	3.71	3.73
5	Agricultural processing	16.95	3.53
6	Textile, apparel & leather	17.72	9.45
7	Wood, paper & rubber	14.10	9.81
8	Chemicals	5.64	5.71
9	Petroleum products	3.19	3.74
10	Machineries & transport equipment	9.75	20.39
11	Other industries	6.58	5.97
12	Services	-4.51	3.21

Source: Clarete (1991).

VI. COMPUTING MICROECONOMIC IMPACTS OF MACROECONOMIC POLICIES

This section suggests a framework utilizing both a small-scale, macro-econometric model of the Philippine economy and a fairly disaggregated CGE model of the Philippine economy. The Bourguignon-Branson-de Melo micro-macro model (1992) is first presented. The structural requirements of the CGE and macroeconometric models are then presented, to address the kinds of macroeconomic policies identified in the second section.

A. *Bourguignon-Branson-de Melo Model*

This model combines into one analytical structure a macro model and a CGE model of a given economy. It essentially serves as a macro model with fairly disaggregated production sectors and household groups.

The model consists of firms which, as in CGE models, maximize profits. They have the same access to a given technology $F(.)$. Capital is fixed but labor is variable. Firms can adjust their capacity utilization depending upon the particular model closure used. They have a demand for working capital and investment financing. Investment demand is based on Tobin's q theory of investment. Financial requirements can be sourced internally through retained profits or externally by issuing bonds. Bonds can be issued locally or to foreign credit sources. Relative prices determine the allocation between local and foreign bonds. Production costs of firms cover the cost of borrowing.

Households derive their incomes from the sale of labor services, interest income, and distributed profits. Out of this and any gains in wealth, households consume and save in every period. A transactions demand for money is specified, along with some interest rate elasticity.

The government sector has an exogenous expenditure and its income come from tax revenue which depends on economic activity. The public sector deficit is therefore endogenous, including the requirements to finance a deficit that is done through the issuance of government bonds locally, foreign borrowing, or credit from the CB.

The authors illustrated the use of the model by simulating a shock such as an increase in the price of imported goods. Their numerically calibrated model applies to a hypothetical economy consisting of capitalists, big farmers, small farmers, landless agricultural workers, modern workers including government, and informal workers. These social classes follow the description of Kanbur (1987) and Heller, et al. (1988).

Their simulation yielded the following results: a shock such as an increase in the cost of foreign credit increases the proportion of the population under poverty, even as the gross domestic product (GDP) of the economy rises but at a lower rate compared to the base run. While both GDP and poverty alleviation are rising, the downward shift of the GDP growth path, as a result of the shock, is less because of an accommodating monetary policy that enables the economy to adjust, in the words of the authors, painlessly.

A commentary. While the authors demonstrated the possibility of coming up with useful policy results through their model, the model would seem to be an *adhoc* creation that does not demonstrate the existence of an equilibrium. But the algebraically consistent system of the model, given the behavioral parameters used, can solve a period equilibrium. Suppose this "maquette" is applied to another country using a realistic model, can the authors determine that a solution to such a model can be found? Unfortunately, there is nothing in their paper that indicates that this can be done. Thus, the model structure needs to be adjusted until a solution is found to solve the model.

Setting aside computational issues, let us reflect on the underlying questions the authors wanted to answer. Given a macroeconomic shock (e.g., an increase in the price of oil which is imported by country *x*), the model should determine the impact of such a shock on the economy, what macroeconomic managers can do to minimize the adverse consequences of such the shock, and how to increase economic growth and efficiency at the same time.

Just focusing on the shock, it would seem that the model presents an easy answer for a framework in CGE models. But if an appropriate macroeconomic policy response is required, CGE models may not be appropriate. The reason lies in the fact that these models are supposed to be unaffected by the level of the numeraire price. Only relative prices matter. Thus, the consequences of changing the monetary policy of a country may not be reflected in CGE models.

However, this is not entirely correct. Money is neutral in general equilibrium models, if no nominal prices are held constant. But if this were not the case and money supply is also exogenous, then changes in the money supply can have real effects in general equilibrium models. This was documented numerically in Clarete and Whalley (1991).

McKinnon (1984) believes in the conventional wisdom of separating micro from macroeconomic theory. Too much baggage is potentially involved if one combines both in one single analytical framework. The Bourginon, et al. model can be criticized in this light, as a macroeconomic model which borrowed microeconomic features of CGE models.

B. *An Alternative Framework*

This paper, therefore, proposes that the core analysis of macroeconomic policies be undertaken using a CGE model and a macro-econometric model to do side computations for use in CGE model simulations. CGE models suits the analysis of long-term impacts of changes in economic policies. But they are inappropriate in analyzing the impact of macroeconomic policies on nominal values such as the nominal exchange rate, general price level, and nominal GDP. This underscores the need for a macro-econometric model. But even in the absence of one, it is possible to undertake policy experiments in ways that reflect the particular short-run characterization of the economy, using appropriate macroeconomic closures of the CGE model. This is explained in the following discussion.

Consider an economy with two-traded goods and a non-traded investment good, a government that taxes imports (for simplicity) and spends this income also on the goods available in the economy, and a private household sector that saves part of the income to pay for the

investment good. Capital inflows are assumed to accrue only to the government. We further assume that this is a simple, pure-exchange economy, i.e., domestic supplies are available in fixed quantities period after period rather than produced using primary factors of production.

Walras' Law in such a model may be stated as follows:

$$P_h(D_h - \overline{Q}_h) + R\,[P^*_m(D_m - \overline{Q}_m) - P^*_x(\overline{Q}_x - D_x) + K] + [R\,t\,P^*_m Q_m - G] + [S - I] = 0 \quad (12)$$

The above equation states that the BOP deficit -- in terms of domestic currency less the fiscal deficit and the savings gap -- sums up to zero if the homegood market is cleared.

Focusing on the macroeconomic relationships, a neo-classical closure would treat the exchange rate, R, in the above equation as endogenous. Since R may be interpreted as the price of the composite traded good, solving for the equilibrium value of R clears the market for foreign exchange. By Walras' Law, the economy's savings surplus (S - I) less the fiscal deficit of the government is equal to zero. This means that private sector finances the fiscal deficit of the government. This is realized by introducing a lump sum tax that assumes a positive (negative) value whenever the government incurs a deficit (surplus).

Another external sector closure rule makes R exogenous and calculates the capital inflow, K, required to obtain equilibrium in the external sector. Since K goes to the government, this rule may be interpreted as letting the rest of the world pay for the deficit of the government. The drawback of this type of closure is that the country can always maximize its GDP by continuously borrowing from abroad which is rather unrealistic.

Focusing now on domestic imbalances, one obtains external sector equilibrium if a component of domestic absorption is adjusted to a level where savings surplus less the fiscal deficit is equal to zero. The second type of closure adjusts the domestic absorption of the economy until the BOP is in equilibrium. The neo-classical closure eliminates the excess demand for foreign exchange in the economy either by adjusting the price of the composite traded good, R, or the capital inflow into the economy.

Another closure rule involves rationing foreign exchange. Suppose that the government fixes the rate at which export earnings are converted into the domestic currency. This scenario entails a dual exchange rate for the economy. Under it, a shortage of foreign exchange rate occurs since the regime taxes export earnings but not the use of foreign exchange. If nothing else is done by the government, the foreign exchange shortage is resolved by calculating a virtual import exchange rate that clears the market for foreign exchange rate. The equilibrium rate in this case is higher than that of the official conversion rate of the government. The difference may be interpreted as the premium value of foreign exchange arising from its scarcity as induced by government policy.

Thus, there are appropriate methods of infusing macroeconomic management measures into CGE models in ways that enable policy makers to calculate their possible impacts as are done in the Bourguinon, et al. model.

However, policymakers may ask for the general price level or other nominal macroeconomic magnitudes. For this purpose, a macro-econometric model needs to be estimated and used. The macroeconometric model should ideally be kept as simple as possible but adequate enough to answer the questions that policy makers have in mind. The model developed by the National Economic Development Authority and the Philippine Institute for Development Studies, which Lamberte (1991) utilized in his study, is a possible candidate, although it has already grown proportionally large relative to the purposes of the proposed analytical framework. Simpler macro-econometric models of the economy such as those proposed by Lim (1992) and Bautista (1992) may be more adequate for the proposed framework of analysis.

C. *Interphase of the CGE and Macroeconometric Models*

The interphase between the two models may focus on the following three areas:

- The computation of real exchange rate changes.
- The computation of real interest rates.
- The computation of aggregate real economic output.

The macro-econometric model will calculate the changes in the nominal values of macroeconomic variables such as the general price level, the nominal exchange rate, the nominal interest rate, and the nominal GDP of the economy as a result of a given macroeconomic policy shock. The underlying real values of these impact magnitudes including the real exchange rate, real interest rate, and real aggregate output are calculated. These real magnitudes are then introduced as shocks into the CGE model to get the microeconomic and distributional consequences of the policy shock.

Identifying the appropriate auxiliary variable, which must be introduced as one more general equilibrium condition into the model, poses a theoretical difficulty. Several alternative auxiliary variables are possible for a given macroeconomic constraint that must be satisfied in equilibrium. Consider, for example, adding the constraint that the real aggregate output has to be equal to a given level. In the CGE model, we may introduce a capacity use auxiliary variable similar to the one used in the Bourguignon, et al. model. An alternative auxiliary variable is a general rate of unemployment variable which must be multiplied with the economy's given endowment of resources. The difference between the two auxiliary variables is that, in the case of capacity use as an alternative, the unemployment only occurs with fixed factors while in the unemployment auxiliary variable, it happens to all factors in the economy, regardless of whether the factor is fixed or not. One can also choose to focus the unemployment only on the unskilled labor as in a labor surplus model (Lewis, 1954); but this creates more complication for the modeler.

In introducing the constraint that the real exchange rate has to be equal to a given level, the auxiliary variable may be the amount of official capital inflows that go into the country or the level of international reserves if this is featured in the CGE model. Alternatively, a component of domestic absorption, e.g., aggregate government expenditures, may adjust in order to satisfy the constraint involving real exchange rate.

In introducing the constraint that the real interest rate is set equal to a given level, a component of domestic absorption, e.g., the level of government investments, may have to adjust in order to satisfy this constraint.

The problem of interphasing comes from the absence of an integrating theoretical framework that completely explains such an interphase. As a result, we have a collection of alternative ways of closing the CGE model, any one of which has varying impacts on the underlying microeconomic agents of the economy. At best, the study suggests that addressing the problem of alternative auxiliary variables may ultimately involve choosing one variable that the modeler deems most appropriate for the Philippine economy.

The lack of an integrating theoretical framework goes back to the root problem in economic theory. The microeconomic and macroeconomic sides of economic theory remains to be separate theoretical fields in economics. As McKinnon cited, there is much baggage involved if one tries to integrate both sides into one common theoretical framework.

Another modeling issue that the interphase poses is the choice of a numeraire in the CGE model. In general equilibrium theory, the choice has no bearing on the real solution of the model. But if we let the CGE model interphase with the macro-econometric model, the underlying numeraire of the CGE model has to be money. This means, therefore, that a commodity called money has to be introduced into the CGE model as in the Clarete and Whalley model (1991). In such models, money is completely neutral unless one nominal price is held constant and the supply of money is exogenous.

The interphase may imply other modeling issues which we would rather address as they unfold.

D. *Model for Poverty Measurement*

Model builders, constrained by what Rutherford (1988) calls the "curse of dimensionality," choose to design models that are unable to answer specific questions of policy makers about impacts on a particular industry or household since the CGE model is aggregate enough. But policy decision makers pay close attention to the details of the impacts of policy reforms. Such is the problem which Balisacan (1992) faced in the case of poverty measurement.

Balisacan developed and used a framework to trace the impact of structural adjustment policy reforms on the poor. The innovation lies in the use of a fairly disaggregated family income and expenditure survey (FIES) data set and the simulation results coming out of a fairly aggregated model.

Balisacan's approach starts with defining poverty index for each of the classified household groups (e.g., rural, urban; subcategories of rural including those households that generate incomes mainly from agriculture, mining, manufacturing, etc.) which is a function of the particular household group's income. The household's income level is then a function of the various prices of commodities that enter directly into the utility function of the household. Assuming utility maximization, a minimum expenditure function can be derived to calculate the income required to attain a given level of utility. At this point, new equilibrium values of the price arguments in the expenditure function resulting from policy changes are retrieved from a policy simulation model (in this paper, the result of the study by Bautista, 1992) and used to recalculate the minimum expenditure function. From these changes in income levels, the modeler can calculate changes in poverty indices which, as discussed above, are fairly disaggregated and can be suited to the wish list of policy makers.

Even if the above fairly approximates what Balisacan tries to achieve, the following points may possibly lead to refining the approach:

Some of the effects that Balisacan reported should be interpreted carefully since the new income level is that which is required to support the utility level before the policy reforms. These effects are changes in poverty level of households resulting from changes in their compensating income variation. What would have been ideal is to calculate the real income change associated with the policy reform and feed such income into the poverty index formula. But to do this, the modeler has to reconcile the income definition on the sources side with the uses side of income. This has been assumed away by Balisacan when he invoked the assumption of recursiveness of the model and separability of production and consumption decisions.

This paper suggests that the recursive and separability assumption should be abandoned. But jointness or simultaneity makes a fairly disaggregated problem computationally intractable -- a difficulty which modelers avoid through aggregation.

Recursiveness and separability, as Balisacan applied, appear to be essential assumptions in this approach. In this case, the practical first step would have to be defining well the income equations of each of the household groups. The changes in the price arguments of disposable income equations, which are retrieved from a model, are then inputed to compute the new levels of disposable incomes. The next step involves recalculating demand equations using the new levels of disposable incomes. One should watch out, however, if any wedges between consumer and producer prices exist, with the consumer prices being used in the demand equations and the producer prices in the income equations. Having done this, one can compute the utility level associated with such changes in demands and then calculate the money metric associated with utility levels. Money metrics are later used to recalculate the poverty index.

Although the above may seem an improvement, some theoretical issues still need to be resolved: Are the simulated equilibrium values of prices associated with policy reforms sensitive

to the level of disaggregation of consumers? The equilibrium solution may not be unique and this has implication on the measurement of poverty. What conditions can we impose on the structure in order to arrive at solutions that are not sensitive to the aggregation level of consumers?

E. *The Adjustment Problem*

Equilibrium models ignore the cost of adjustment from one to another equilibrium. This occurs, for instance, when tariff rates are lowered and the model computes the counterfactual equilibrium associated with the policy change. The length of the adjustment period and nature of the adjustment problem cannot be obtained from the CGE model -- an information which policy makers might want to obtain.

Existing models try to incorporate the cost of adjustment (e.g., Clarete and Whalley, 1988 in the case of labor adjustment costs). In such models, an estimate of the length of the adjustment period is obtained extraneously from the literature and the nature of the adjustment cost (e.g., the loss of output as some workers are temporarily displaced, retraining cost, and moving cost). Given these information, Clarete and Whalley introduced an adjustment services sector into their model; this sector produces adjustment services to workers displaced by policy shocks. These services are produced using the economy's resources. The above may just be one of the possible ways of incorporating the adjustment cost into the CGE model.

VII. AN OVERVIEW OF A CGE MODEL

The general equilibrium model used in this section characterizes a small, open economy. It consists of 12 production sectors, each of which produces an import substitute and an exported good. The respective production technologies in these sectors use a constant elasticity transformation function (CET) between the import substitute and the exported good.

Every production sector uses three primary factors: labor, capital, and a sector-specific factor. Labor and capital are perfectly mobile in the model. The sector-specific factor consists largely of fixed capital inputs in production. The three factors are combined using a constant elasticity of substitution (CES) function to generate the value added of the sector.

Intermediate inputs are used in fixed proportion to total production of the sector. The individual commodities used as intermediate inputs are first aggregated using a Leontief function to produce a composite intermediate input. The composite intermediate input combined with the value added in that sector produces the joint output of the sector. A Leontief function aggregates the value added and the composite intermediate input.

The individual intermediate input used in production is an Armington-aggregated good. From a modelling point of view, it is convenient to form 12 additional production sectors. Each of these produces an Armington-aggregate good whose inputs include an imported good and its local substitute. These goods are, in turn, demanded both for intermediate and final use. Given this structure of production activities, locally produced goods serve only as inputs in the

Armington-sectors and for exports. All the other product demands in the model are supplied with Armington-composite goods.

The country is a price-taking economy in both imports and exports. A modelling problem associated with small, open economy models involves several sectors producing nothing in counterfactual simulations. As is well known in trade theory, competition will drive tradable sectors, in excess of the number of primary factors which are relatively inefficient compared to the rest of the economy, to shut down in the counterfactual equilibrium. This problem does not arise in the model for two reasons. One is the inclusion of sector-specific factors in the model which ensures that there are at least as many non-tradable factors as there are sectors in the model. Second, local and imported goods are assumed to be less than perfectly substitutable.

Twenty households form part of the model, distinguished by personal income and location (rural and urban). Each household is endowed with the primary factors used in production which provide its income. Its income is allocated between current and future consumption. Current consumption consists of the seven consumer goods, while future consumption translates into the various investment goods the consumer is willing to purchase at any given time.

The government imposes the following tax measures: An excise tax is imposed at the manufacturer's level or at the border on selected items. A VAT is a general consumption tax collected using a credit method. Primary agriculture and exports are exempted from the VAT system. From a modelling perspective, it would have been convenient to treat the VAT as a simple tax on value added. But due to an on-going policy debate in the country, it is crucial to retain the credit method of collecting the VAT in the model.[15] The VAT, as modelled, would thus consist of a sales tax and tax credits on the intermediate inputs. Imports are covered by the VAT.

Aside from meeting the excise and value added taxes, imports also pay in local currency a duty based on the border price of the imported good.

The model incorporates the corporate income tax. This tax is featured in the model as a tax on the profits of each production sector. Since profits are the imputed earnings on sector-specific factors, the corporate income tax is, therefore, important in explaining the investment decisions made by agents in the model.

Out of its tax income, the government demands goods and services to produce government services. In the model, this is represented by a utility function of the government whose arguments include the consumption and investment demands of the government sector. Investment demands of the government are assumed to be applied only in the services sector of the model. This implies that GOCC are not central in the model.

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[15] This policy problem is describe in Clarete (1991).

Investment and Savings

A homogeneous supply of a capital good, which is produced locally, uses a production function which transforms producer goods into the homogenous capital good in fixed proportions. The producer goods are either locally produced or imported. The two combine in a CES production function to produce a composite producer good which then becomes an input into the Leontief production function for the capital good.

The total supply of variable and fixed (sector-specific) capital in the economy is updated at the end of every period, with the new capital good produced in that period. But the additional capital supply becomes productive only in the next period.

We allocate the supply of new capital goods into variable and sector-specific capital. This is because, of all the capital good supply produced at a given period, a part of it is truly variable. Structures (e.g., buildings and office spaces), for example, can be used by any production sector in the economy. Other capital goods become part of the economy's fixed capital formation which is specific to the sector.

Each household in the model is assumed to maximize an inter-temporal utility function. We can break this utility maximization problem into two stages: first, a problem of allocating disposable income between savings and current consumption, and second, allocating each of the two into their component consumption and investment demands.

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